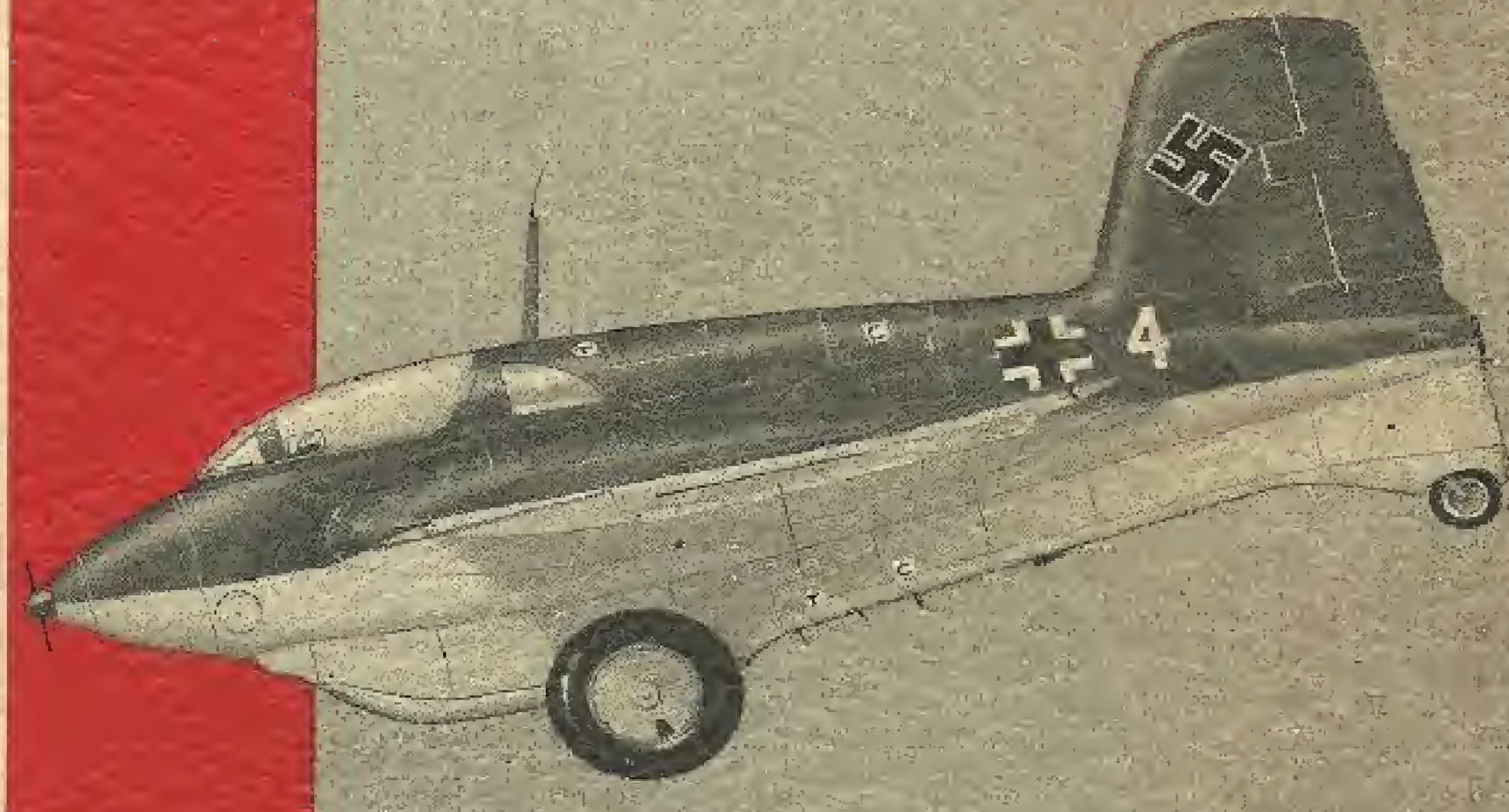
Messerschmitt

163



"KOMET"

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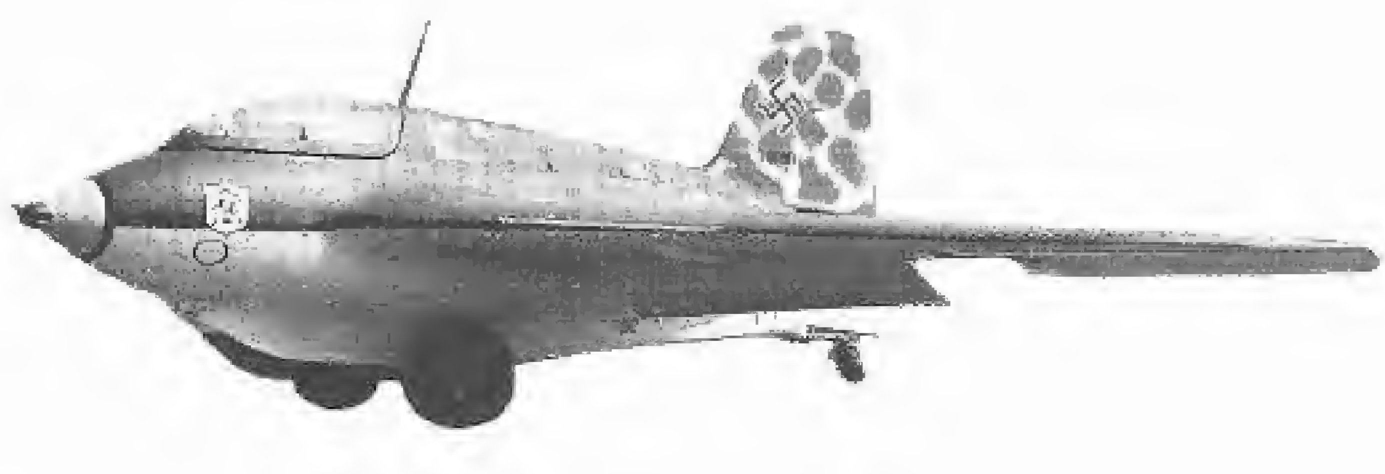
Messerschmitt 163

by Edward T. Maloney and Uwe Feist
Edited by Ronald Ferndock



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MESSERSCHMITT ME 163 KOMET

by Edward T. Maloney

Edited by Ronald Ferndock

CONCEPT

So far, aeronautical science has discovered that supersonic speed is possible in at least three ways. One, by sweeping the wings either backward or forward; two, by using wings of very thin profile and thus, of low aspect ratio, thereby effecting the same speed result; and three, by providing a jet engine or some suitable power to pump and suck away the boundary-layer on the wing in the area of compressibility shocks. Used together, these techniques complement and supplement each other, making for a more efficient end-product than could be had with a single and separate use of each design method.

Of the three principles, the swept-back wing was most suitable for aircraft-structure technology as it was understood just prior to and during World War II. Such a V wing, used to forestall the compressibility shock-wave, is an extremely simple principle, allowing speeds well into the transonic and even supersonic range while still maintaining desirable handling characteristics. Design emphasis of this technical principle tends to produce a somewhat unusual airplane of compact all-wing arrangement with the cabin and engine and wings being blended into the shape of a single unit.

Such was the thinking of Professor Alexander M. Lippisch who developed the world's first operational rocket interceptor, the Me 163. But this interesting fighter began much earlier than the thought of supersonic tactical aircraft. It began, as a point of fact, with Dr. Lippisch's work at the German Research Institute for Sailplanes (Deutsche Forschungsanstalt fur Segelflug or D.F.S.) where he was largely responsible for the development of the tailless aircraft, notably the two-seat DFS 39 Delta IVb powered by a small Pobjoy engine. As an extension of his earlier effort, he later developed the more powerful DFS 40 Delta V with an Argus engine and pilot in a prone position.

A man of several interests, Dr. Lippisch also took part in the Opel-Sander-Valier rocket-propulsion project of 1928 as assistant to Dr. A. Baeumker, Chief of the German Air Ministry's (R.L.M.) Department of Research. Because of all of his involvements, at a later time (1937), Dr. Lorenz, another assistant to Dr. Baeumker, approached Professor Lippisch and proposed the groundwork for a suitable airframe to serve as a test vehicle for rocket-motor propulsion and high-speed research. There were general agreements and the project was on.

A new project-configuration, based on the DFS 39 and ordered built by Dr. Lorenz, was worked out and wind tunnel mock-ups were made. Since the new plane, the DFS 39 Delta IVc, possessed good flight characteristics, it was used as a basis for much data comparison; however, it was to be modified with a smaller wing planform for the high-speed research flights when they were to be made. Subsequent free flight and wind tunnel tests showed insufficient directional stability and unsatisfactory yaw-roll performance — both problems requiring some further design change. For example, the original wing dihedral was eliminated and a vertical fuselage surface replaced the wing tip rudders. These changes controlled the high-speed flutter so much so that new test mock-ups gave exceptionally good performance in the wind tunnel.

However, Professor Lippisch experienced considerable difficulty with spring loads in the controls. The control system could not utilize springs since air loads are parabolic while springs are linear, meaning that aileron flutter was always possible anywhere along the speed range. The aileron balance was originally 20%, and wing thickness measured 14% at the root and 8% at the tip. After extensive testing, the ailerons re-figured with a 26% aerodynamic balance and a wide wing-slot opening. Wing angle of incidence was about 3 degrees at the wing root and a negative 2.7 degrees at the tip, giving a wing washout of 5.7 degrees. Elevator trim tabs were tried, but flutter recurred and so they were removed. The negative angle of incidence at the tips was to prevent stall and to create negative lift at high speeds, thus creating a stability lost by the absence of a horizontal tail. In addition, investigations demonstrated that tailless airplanes were uncontrollable in a spin, so the wing slots were later increased to about 40% of the wing span.

Another, and assuredly, as important a part of the Me 163 story, was that, in 1936, Professor Helmut Walter founded a factory to build rocket-propulsion motors at Kiel in order to provide take-off and climb rocket boosters for light aircraft. Too, Walter experimented with a hydrogen-peroxide rocket for shooting life lines and life-saving equipment to ships and inaccessible areas. But another use for the rocket concept with airplanes took precedence. In an effort to study and determine the roll characteristics of an aircraft, a small rocket motor was installed on each wing tip of a test vehicle. When each rocket was fired, an accurate record could be made of the rate of roll. Walter's success in assisting the rate of climb with small private airplanes and in the roll tests suggested the possible use of the rocket principle to propel high-speed military aircraft. This is not to assert, however, that all important people in the aircraft industry saw the rocket-plane potential. Quite a number did not, for the programs, especially regarding the airframe, were not always enthusiastically supported. Nevertheless, some visionaries like Lippisch, Baeumker and Helmut Walter managed to keep the idea alive and growing.

The first rocket motor installed in a high-speed airframe (1940) was the Walter HWK R.II-203. Using T-stoff, hydrogen-peroxide fuel and water with potassium or calcium permanganate as a catalyst, the engine unreliably produced about 1,650 lbs. of thrust. It was only partially successful because it tended to obstruct the jet openings.

Sometime later, the Walter Werke developed a new fuel catalyst of hydrazine hydrate and methyl alcohol. Running at high temperatures and producing greater thrust, this advancement, known as "C-stoff," provided smoother combustion from turn-on to shut-down. Importantly, it solved the operational problem of clogging the jets created with T-stoff. Called the "HWK-509," the new engine using the new fuel powered the Me 163V3 during its test career.

Airframe development to take the Walter motors experienced difficulties of its own. Because secrecy was wanted on the project, facilities at the D.F.S. were never expanded and soon became cramped and impossibly insufficient. As a consequence, it was decided to make only the wing at the Research Institute and to build the fuselage at the Heinkel plant, under that manufacturer's management, where the rocket could also be installed.

During the distressingly slow advance in the Delta aircraft high-speed research development program, Dr. Lippisch, incorporating what was learned from the DFS 39, designed the DFS 194 to assess performance at the low-speed and medium-speed ranges. This design was quite similar to that intended for the high-speed research airframe. Construction began in 1938 on a glider version to obtain the needed aerodynamic data, but trouble followed, and problems with the Heinkel firm prompted Professor Lippisch to assume responsibility for the whole research project. With some twelve engineers, he moved to the Messerschmitt plant at Augsburg where his program became "Section L." The high-speed airframe design number became the Me 163, but the low and medium-speed DFS 194 number remained unchanged.

In the spring of 1941, the high-speed experimental models Me 163V1 and V2 were completed at the Messerschmitt plant. These planes were committed to powerless test flights until they could be transferred to Peenemunde-Karlshagen, the highly secret German wartime test center. While awaiting transfer, then, the Me 163V1 and 163V2 made several glide flights, being towed aloft by specially equipped Bf 110s.

MESSERSCHMITT INFLUENCE

The removal to Augsburg brought the project out of the control of a pure research concern and put it in the aircraft industry and, as such, under the direct authority of the R.L.M. of the Luftwaffe. This organization, through its Aircraft Development Section, placed Herr Antz as director of the overall program. It was at this time that the "Me 163" number was created.

Facilities available at Messerschmitt were expected to stimulate the program and accelerate development; but, as we shall see, circumstances were not to be so generous.

In the meantime, the almost completed DFS 194 followed its builders to Augsburg where it became a special project of Messerschmitt A. G. where the first concern of Section L was to develop an operational rocket-powered fighter plane. Proceeding along these lines, the DFS 194 glider underwent modifications to make it a low-thrust rocket-power test vehicle - a sort of first effort at the Me 163. Obviously, because the glider was not originally intended as a highspeed performance aircraft, changes were made to take the small 660 lb. static thrust Walter HWK R.I rocket motor. (The term "static thrust" refers more directly to air breathing jet engines where movement changes actual engine thrust values. And

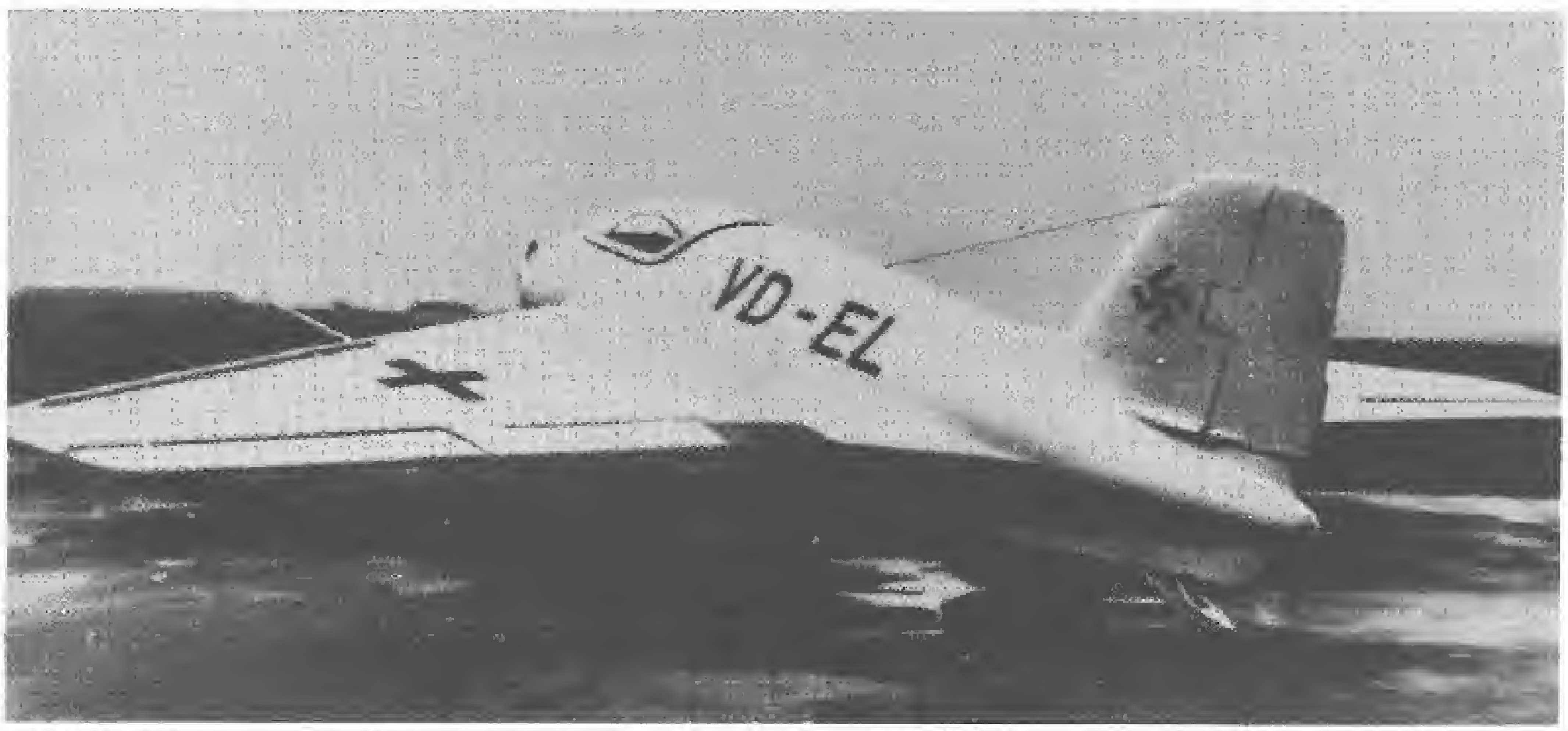
even though the rocket engine and jet engine are both measured in a static condition, at 40,000 ft. at a given air speed where the engine inlet "Q" force is different, the jet engine will produce a different thrust whereas the rocket engine will remain constant.)

With the outbreak of war in 1939, a revised set of priorities were imposed on the German Aircraft Industry than had existed in pre-war years. Hitler expected a short war, hence existing operational designs were of first concern. His myopic view severely limited the needs of research aircraft, hampering efforts of design and restricting availability of materials. In consequence, the powered DFS 194 was not ready for testing until 1940.

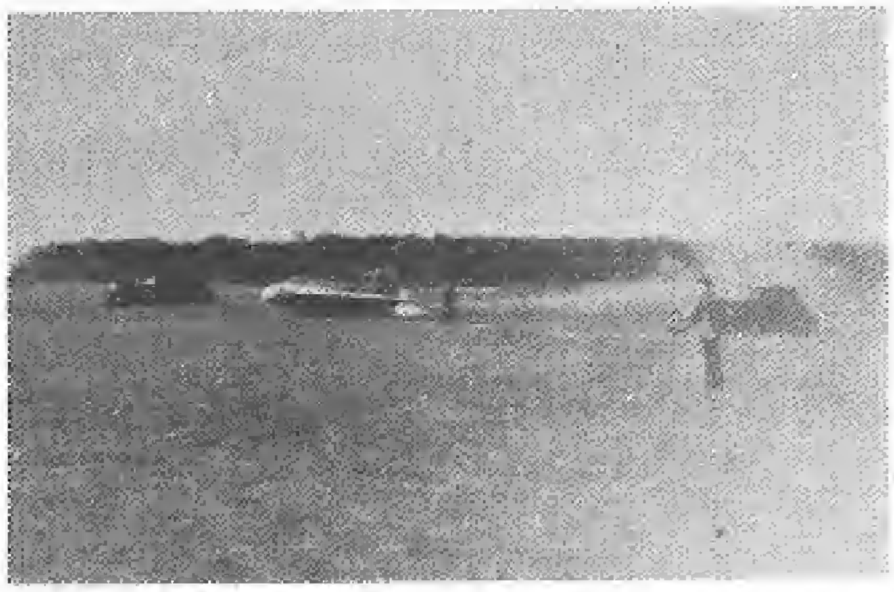
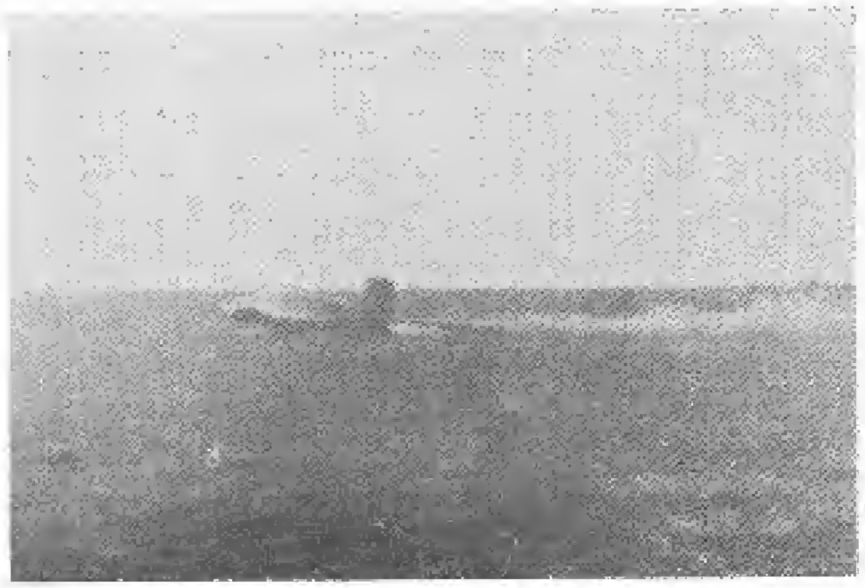
When eventually finished, the completed plane was taken to the experimental text center at Peenemunde where Captain Heini Dittmar piloted it through its flight trials the following summer. Again, it must be remembered that the DFS 194 was not designed or built to undergo high speeds, and the plane flew only at a maximum 340 m.p.h. Nevertheless, since the general characteristics of the aircraft were good and since flights did exceed expected results, these tests were considered successful. As a matter of fact, the flights provoked enough interest to step up the whole development program. But this optimism was imperfect, for personal rivalry darkened the atmosphere.

Almost from the beginning, an unwholesome friction existed between Alexander Lippisch and Willy Messerschmitt over the Me 163 project. A covert antagonism smouldered between the men until 1943 when it became an undisguised and active hostility. Dr. Messerschmitt did not like tailless aircraft in general, nor did he likewise care for rocket fighters. He was also jealous of the fact that the Me 163 was not a plane of his design, a notion which caused him to suspect that work done on the Me 163 was work taken away from his own Me 262 twin-jet fighter project. So it was that since Dr. Lippisch had his own project and operated independently in Section L, he was not popular at Augsburg. The discord ultimately ended in 1943 when, after having done as much test work as was possible in Augsburg, Professor Lippisch left Messerschmitt to lead the Aeronautical Research Institute in Vienna. Although the Me 163 stayed in Augsburg, Dr. Lippisch, for a time, continued as consultant to the design development — at long distance, of course.

Yet even with Professor Lippisch in Austria, Messerschmitt seemed resolved to be rid of the invidious intruder he left behind. Soon after the break between the two scientists, the R.L.M. was told, unofficially, that Augsburg had too many types and versions of conventional aircraft to handle and was further committed too heavily for other projects to do justice to the Me 163. It was not long after Dr. Lippisch left Augsburg, therefore, that the fighter development and production of the "A" model (the Me 163V2 was its prototype) was transferred to the Hans Klemm Aircraft Plant — a company which had previously only manufactured light training airframes. Design development beyond the Me 163A continued at Augsburg.



The Me-163 V-3 was the basic prototype for the operational Me-163B "Komet" series.

A Me-163A takes off from Bad Zwischenahn.

ME 163V1, 163V2

The Me 163V1 and V2 high-speed prototypes were completed at Augsburg in the spring of 1941, in the grey time of the Lippisch-Messerschmitt feud. The R. L. M. saw the potential of this weapon and so they immediately insisted on security controls. No rocket-powered flights were permitted at Augsburg, therefore, preliminary flight tests, piloted by Heini Dittmar, were made by towing the aircraft to altitude behind a Bf 110, disengaging between 15,000-20,000 ft. and gliding back to the landing field. Stalls, controls, high-speed dives, water ballast and such like tests were done. In early dives, faulty mass balancing caused a serious rudder vibration and aileron flutter, but once corrected, the flying characteristics of the plane improved considerably. Yet Dittmar also discovered an old and more dangerous weakness (as in the DFS 39) in that the aircraft could barely be controlled in a spin. To correct this hazard, fixed wing-slots were provided to prevent tip stall and to give lateral and pitch control.

In the summer of 1941, after the free flight exercises at Augsburg, the Me 163V1 was taken to Heimat Artillery Park experimental plant at Peenemunde-Karlshagen where powered tests were conducted between August and October. The V2 prototype continued with the towed and glide tests at Augsburg for a short time but joined the V1 at Peenemunde when a second engine became available. For their powered tests, both machines were fitted with the HWK R.II Walter rocket engine, developing 1,650 lbs. of static thrust. First flights showed that the engine's jet needed to be adjusted for thrust line to the airframe flight centerline in order to balance the two and obtain the closest harmony between engine and airframe, so necessary for good flying. More towed flights were made with water ballast simulating full loads — the water could be jettisoned in ninety seconds if trouble developed. Next came rocket take-off tests and the full flight spectrum. Take-off speed clocked at 170 km./hr., requiring 4,000 feet to become airborne, and normal landing speed was 110 km./hr. with some full load landings coming at 160 km./hr.

During the fourth engine-on flight, Captain Dittmar sped at 472 m.p.h., beating the existing world record of 469.22 m.p.h. But the rocket-powered take-offs severely circumscribed flight endurance and level flight speed-runs even at minimum altitudes. As a consequence of the furious fuel consumption of the engine, yet at low altitude, there remained but four-and-a-half minutes of flying time in the fuel cells. In these circumstances, a top speed of only 570 m.p.h. might be reached before supply was exhausted. So, in an effort to conserve fuel and thus lengthen the high-speed runs, Dittmar resurrected the idea of a tow to good altitude where the rocket could be fired and longer level flights could be made. In this way, the two "V" series were continually and successfully tested.

With these results in hand and with expectations for still better achievements, the deficiency of the quite unreliable HWK R.II was overlooked in the enthusiasm to continue the program.

Then on October 2, 1941, Heini Dittmar attempted an all-out speed-run in the Me 163V1. He disengaged the tow cable at 13,000 ft. and started the rocket motor. Climbing to only 14,000 ft., he leveled off and ran flat for two minutes, attaining a spectacular 1,004 km./hr. (623.85 m.p.h.), his exact speeds on all these powered flights being recorded by six kinotheodolites strategically placed at several points along the course. These machines proved that Captain Dittmar was the first man to travel more than 1,000 km./hr. Unfortunately, however, it was at this speed that the pilot experienced his first compressibility effects, in consequence of which the plane tucked under and nosed down into a dive. Dittmar cut the rocket and finding that he slowed up rapidly enough to regain control, he brought the Me 163V1 back to the airfield without other incident. Later, for this day's work, Dittmar received the highest award for powered flight, the Lilienthal Trophy for Aeronautical Research.

The Me 163V1 was purely a prototype with no effort to provide production capabilities. On the other hand, the Me 163V2 was intended as a prototype of the Me 163A, for which production was planned and a series of ten Me 163A airplanes were built.

ME 163A

Obviously, with the building of ten production Me 163As, more test pilots were needed for the experimental programs. Enlistments secured some of Germany's superb glider pilots, including Hanna Reitsch and Wolfgang Spate — Major Spate later formed the first operational test group equipped with the Me 163B-1 at Brandis, near Leipzig — and Heini Dittmar brought his sailplane comrade Rudolf Opitz into the test training program. It was Opitz who replaced Dittmar as chief test pilot after the Captain suffered a serious spine injury flying the Me 163V3.

The Hans Klemm plant delivered three Me 163A-0 airplanes while seven Me 163A-1 frames came from the Messerschmitt factory at Regensburg. At first, all ten Me 163A airframes served in operations as pilot training gliders with water tanks compensating for the engine and fuel weights. Each pilot managed about six flights, all being pulled aloft behind a Bf 110 tow plane.

On these Me 163s special control glide-flaps, located on the lower wing just aft of the mid-chord, deflected fifty degrees at full position. Serving as a drag flap, they offered little to no lift increase.

When pilots graduated from the glider phase of training, the Me 163As were fitted with Walter rocket motor HWK R.II-203 fueled with T-stoff — a chemical functioning at comparatively low temperature and which often clogged the jets, resulting in an interrupted and fluctuating thrust. Since thrust was all but smooth, the engine was not to be trusted. Nevertheless, no explosions marred the Me 163A tests even though the plane's sensitive fuel, hydrogen-peroxide, which explodes if contaminated by dirt, rust or other such like impurity, required extremely cautious and careful handling by personnel involved. (The Me 163B airplanes were not to be so fortunate.)

Before making flights with the HWK R.II, engines were run-up ten times on the ground. Combustion chamber pressures read between 15-25 atm with about 30 atm in the pumps. In the plane itself, engine instruments marked turbine rpm, pressure and temperature in the combustion chamber and other such operating functions; all other instruments were flight instruments. Normal take-off conditions demanded 8,000 rpm, 20 atm and 600° C. temperature.

ME 163V3

The Me 163V3 was the prototype for the Me 163B operational fighter series. Although airframe construction began in December 1941 and was completed, on schedule, in April 1942, first powered flights did not begin until August 1943 (at which time the Regensburg plant had completed eight production Me 163B-0 airframes). The Me 163V3 was to have an improved Walter rocket motor, the controllable thrust HWK 109-509, but difficulties with the throttle mechanism delayed installation and were not solved for some considerable time. In the meantime, glider and two test flights took place until the first new Walter engine was delivered to Peenemunde in the summer of 1943.

The new "hot" motor produced about 3,500 lbs. thrust and consumed 1,100 lbs. of fuel per minute. With this new motor, the plane's performance improved, for, as the plane climbed to altitude, the thrust remained constant and weight and wing load factors became less. Because there is reduced "Q" force in the thinner air of higher altitudes, the airplane proved quite maneuverable and tests continued favorably.

ME 163B

As early as December of 1941, Dr. Lippisch undertook redesign of the Me 163 to make it ready for military use. This operational model was the Me 163B series. The Me 163B-0 had two 20mm MG 151 cannons, while the Me 163B-1 was armed with two 30mm MK 108 weapons in the wing roots, with sixty rounds for each cannon.

Approximately, 370 Me 163B models were made before the end of the war, about seventy of which were built at Regensburg before production transferred to the Dornier factory at Oberpfaffenhofen and the Bachmann von Blumenthal plant at Furth, where most of the Komet interceptors were manufactured. But trouble, confusion and diversion so interfered with building that construction was eventually transferred again — this time to the Junkers plant at Dessau.

Powered by the two-fuel HWK 109-509 A-2 liquid rocket motor, capable of developing approximately 3,700 lbs. of static thrust, normal maximum speed for the Me 163B-1 was about 560 m.p.h. below 30,000 ft. and about 590 m.p.h. above. The plane could reach 39,000 ft. in three minutes, seventeen seconds and 49,600 ft. in three minutes, twenty-six seconds. Total fuel load consumed on a flight was 5,300 lbs. at a rate of 1,100 lbs. per minute.

The motor, itself, was designed to function on highly concentrated hydrogen-peroxide and gasoline (or hydrazine hydrate) with a simple chemical reaction. Being forced by ram pressure in the tank, the hydrogen-peroxide automatically exploded when passed over a small block of potassium permanganate (or possible substitute of potassium cupracyanide), giving water in the form of steam and excess oxygen. The fuel T-stoff (basically hydrogen-peroxide and water) mixed with C-stoff (hydrazine hydrate and methyl alcohol) then burned with the oxygen to create high temperatures and powerful thrust.

Critical mach design of the Me 163B was 0.84 or about 625 m.p.h. at sea level. Above this speed the compressibility shocks upset normal pitch, and the plane consistently tended to go into an uncontrolable dive. To correct this, Dr. Lippisch redesigned the adjustable slots fitted to the Me 163V3 (prototype for this series) and very successful low-drag, fixed wing-slots replaced the earlier efforts. Because of the high-speed altitude and because of the fact that the contours of the slots offered no air flow from the lower high-pressure surface to the upper low-pressure surface, drag from these slots amounted to just two or three percent of the total air-frame drag The wing itself, had a 23.3 degree sweep on the leading edge.

As for the pilot, he flew from a seat in the upright position, which could be vertically adjusted on the ground and jettisoned, if need be, along with the cockpit canopy. A FUG-25 radio with frequency selector control box and FUG identification transmitter supplied communications needs.

On the ground, mobile battery trucks provided power starts for the fuel pumps and rocket motor and once started, the engine developed take-off thrust in forty seconds. Lift-off in the Me 163B marked at 190 km./hr. with chamber pressure at 340 lbs./sq. in. However, if on the take-offs, pressure fell below 256 lbs./sq. in., the engine had to be shut down while the pilot hoped for the best from the temperamental fuel. But on a normal flight, the exhilaration of take-off and, especially, of climb-out really require a special language for adequate description.

Since the Me 163B had no main undercarriage, take-offs were made on a two-wheel trolley and landings on a skid. After lift-offs the pilot activated the undercarriage switch and the wheels dropped from the aircraft. At that moment, the pilot was dragged back into his seat with tremendous pull, and before he could adjust his senses to this sudden shock, he found himself "rocketing" upward at a 45 degree angle, doing 435 m.p.h.

Because of the accelerated rate of climb and the intended high-altitude operations, pilots were fed special rations to prevent intestinal gas or bends. They also wore special flying suits impregnated with a non-burning substance. Such uniforms were a necessary precaution against rocket fuels which burn most any material on contact.

Once airborne, the Komet was easy to fly, yet at the same time, the plane always remained dangerously unpredictable. Some exploded before the pilot stepped into them, some blew up on take-off and some exploded during the landing slide — a long 500 yards of potential disaster.

In front of its guns or behind them, then, the Komet was an uncertain menace to both enemy and "friend" alike. Pilots had to touch-down with the softness of a falling leaf on a windless day, and alertness on landing was vital every second, as it was throughout the flight, for any irregularity or misjudgment on touch-down, or on take-off, for that matter, meant instant death to pilot and destruction to plane.

If the Komet alarmed the Allies, it most certainly frightened its pilots even more.

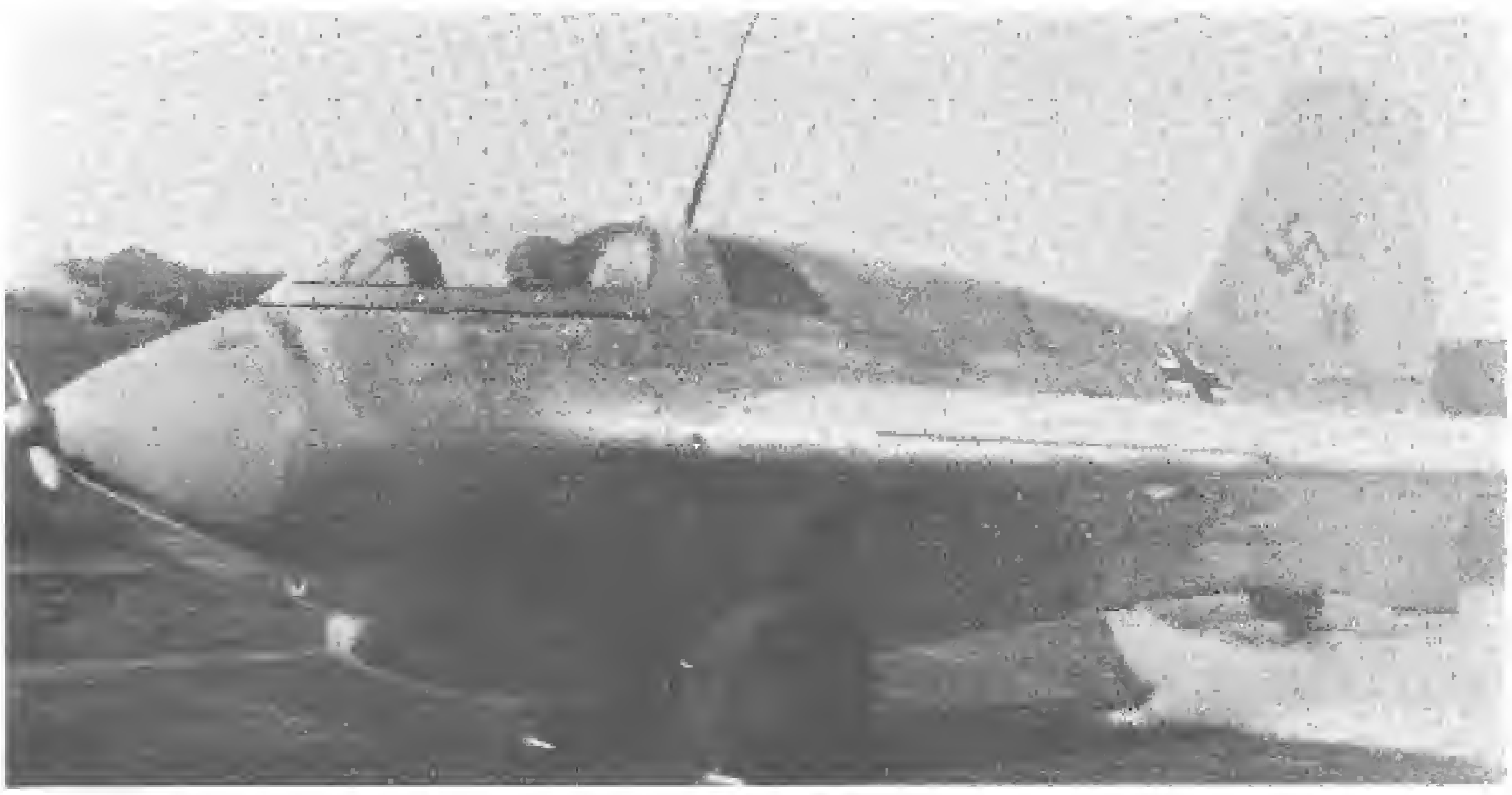
Ground run-up of the Me-163 V-6.

ME 163V6

Attempted improvements on the Me 163 design took it into the V6 experimental model, the prototype of the Me 163C. Developed by the Junkers plant at Dessau, with the extensive help and consultation of Dr. Lippisch, then in Vienna, the aircraft came under the design influence of a group headed by Professor Hertel, who originally came to Junkers from Heinkel where he worked on the He 112, 100D and He 177 as project engineer.

Although similar to the Me 163B, the Me 163V6 had increased fuel capacity and an improved Walter rocket motor that weighed 445 pounds and produced about 4,400 lbs. of thrust. The engine was somewhat unconventional, for it really had two combustion chambers: the upper or main chamber developed about 3,750 lbs. thrust and a lower and much smaller chamber was capable of 660 lbs. of thrust. This particular configuration of two engines in one motor came about as Helmut Walter attempted to improve the efficiency of his rocket motors which suffered energy loss and wasted fuel at the low outputs of cruising speed. Both engines fired at take-off and during the climb, but after reaching altitude the pilot shut off the large engine and cruised on the smaller thrust rocket. In this way, a better thrust/fuel-consumption ratio was possible than with a throttled back main engine. Hence, with the increased fuel supply and a more efficient power system, flight time increased from about eight to twelve minutes of power-on flying.

The Me 163V6 measured slightly larger dimensions than the Me 163B, having a span of 32 ft. 2 in. and a length of 23 ft. 1 in. compared to 30 ft. 7 in. and 18 ft. 8 in. length of the earlier model. Maximum gross load increased to 11,295 pounds from the 9,500 pounds of the Me 163B. The extra weight kept the maximum speed, even with both engines burning, at approximately the same rate as that capable with the "B" model, about 590 m.p.h., but that was at 40,000 ft. Service ceiling improved to just above 52,000 ft.



The Me-163 V-6 featured a special auxiliary cruising chamber for longer flights.

ME 163C

Only a few pre-production Me 163C-0 airframes were built before V-E Day. While the wooden outer wing panels of the Me 163B were kept in the "C" model, the plane had a redesigned fuselage and a "bubble" type canopy, for better visibility, over a pressurized cabin. Adequate armor plating protected the pilot and the two 30mm MK 108 cannons were relocated from the wing root installation of the Me 163B to the forward nose section in Me 163C.

Main power was supplied by the HWK 109-509A-2 engine with a HWK 509C cruising motor directly below the larger unit. The powerplant was held rigidly in position against the connecting frame of the forward fuselage, and to the aft fuselage by eyelet fittings. A thrust plate supported the engine mount.

All electrical wiring to the powerplant could be disconnected via an access door on the right side of the fuselage. All lines circumventing the motor had to be arranged and installed before fitting to the engines. So chancy and dangerous was the fuel problem that all lines had to be thoroughly tested for absolutely tight fit. This was done by pressuring water through the systems in order to check for leaks.

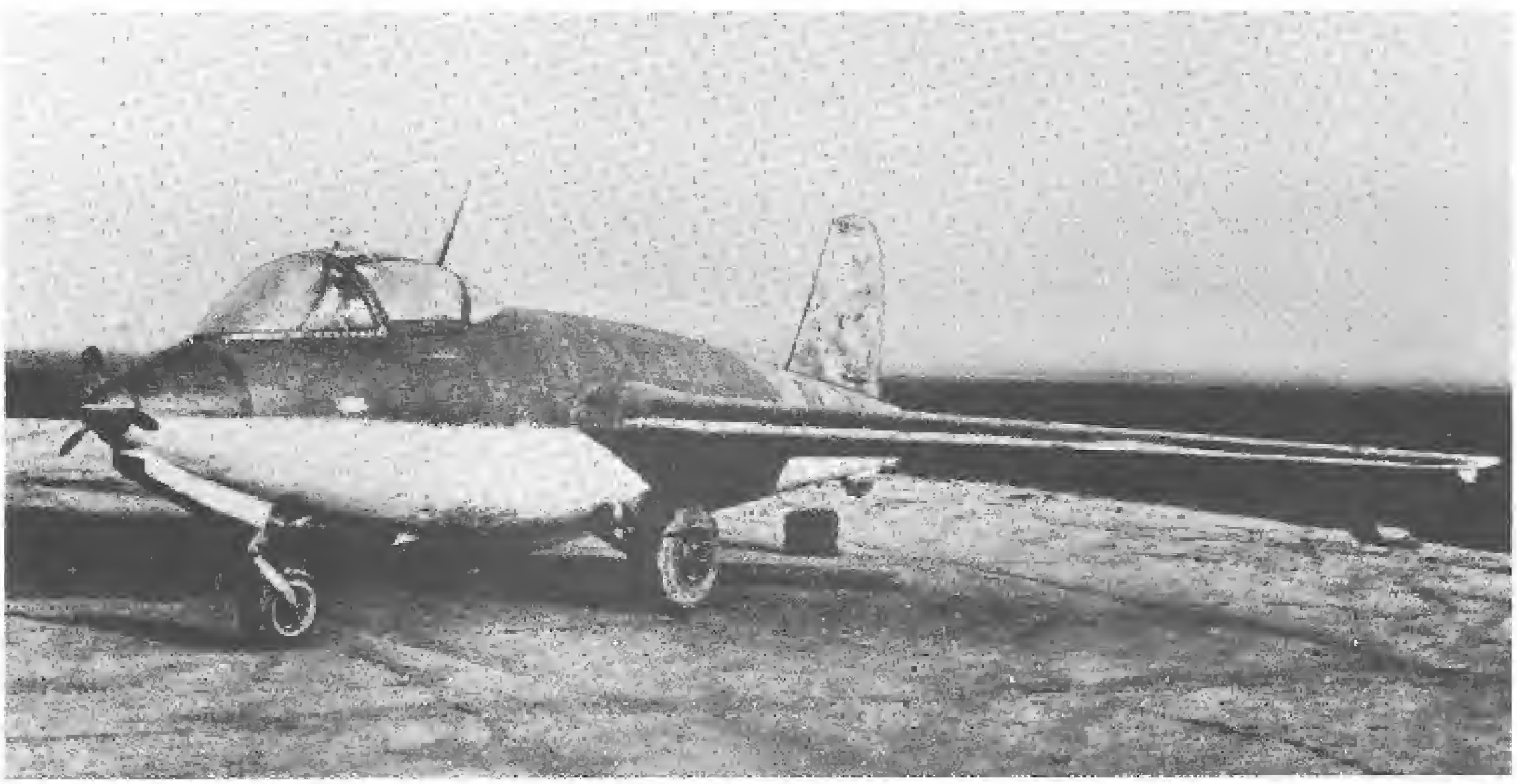
A series system of push-pull rods regulated fuel delivery to the engine from the three T-stoff tanks and the four C-stoff store cells.

ME 163D

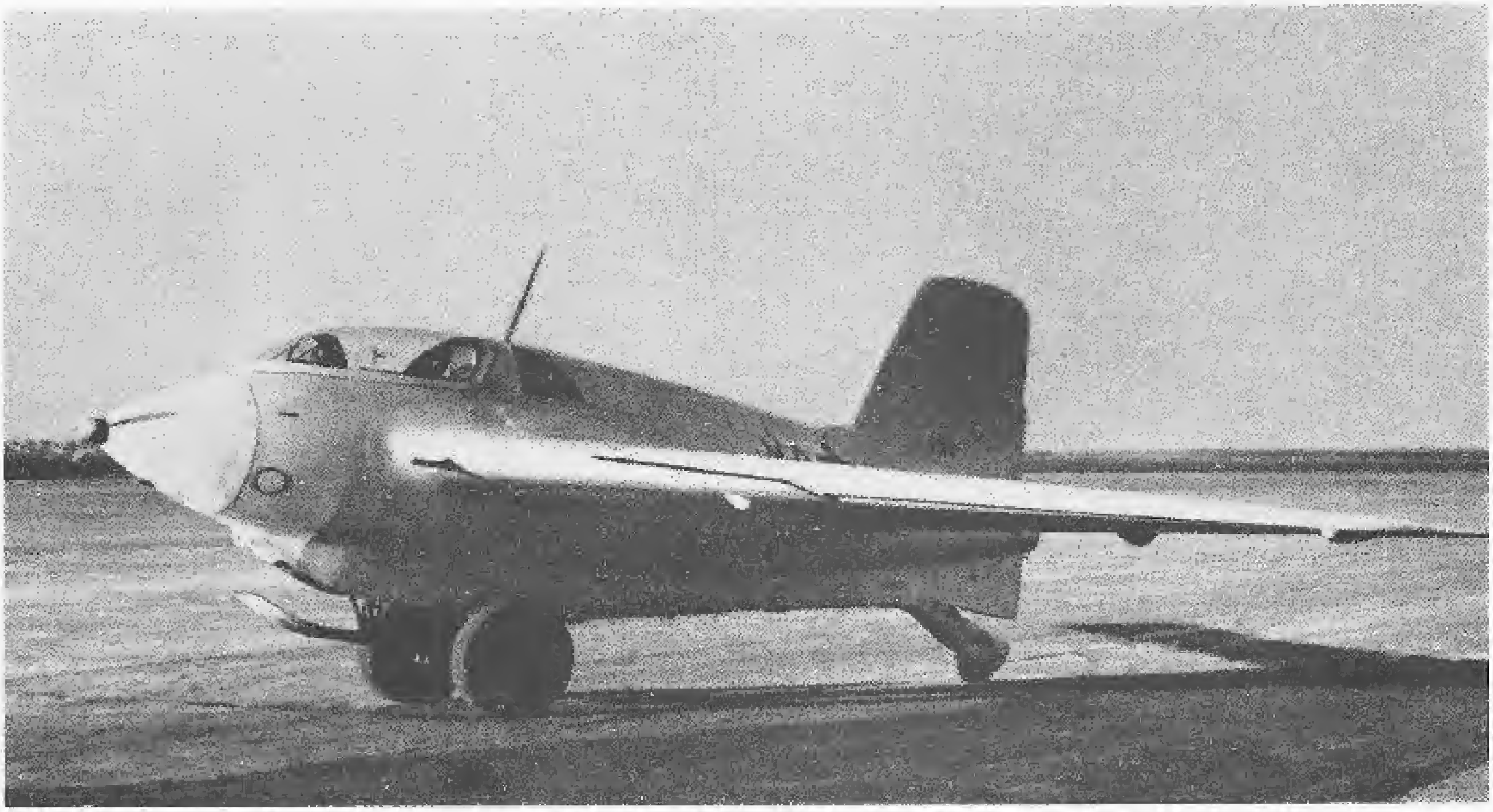
While the Me 163C was being tooled for production, work, under Heinrich Hertel, proceeded on further refinements of the Lippisch design. Variously numbered Me 163D or Ju 248 or Me 263, the project proprovided a considerably cleaned up fuselage, retractable landing gear, increased ammunition and more fuel space than with the Me 163C. Although no production models were built, estimates suggested that maximum speed would be the same as the previous Me 163B and "C" models (about 590 m.p.h.), but endurance was expected to increase from twelve to fifteen minutes of powered flight.

The prototype Me 263V1 made powerless glide flights at Dessau before being sent to Messerschmitt A.G. in the autumn of 1944 for tests under power.

Germany's collapse precluded production plans and preparations.

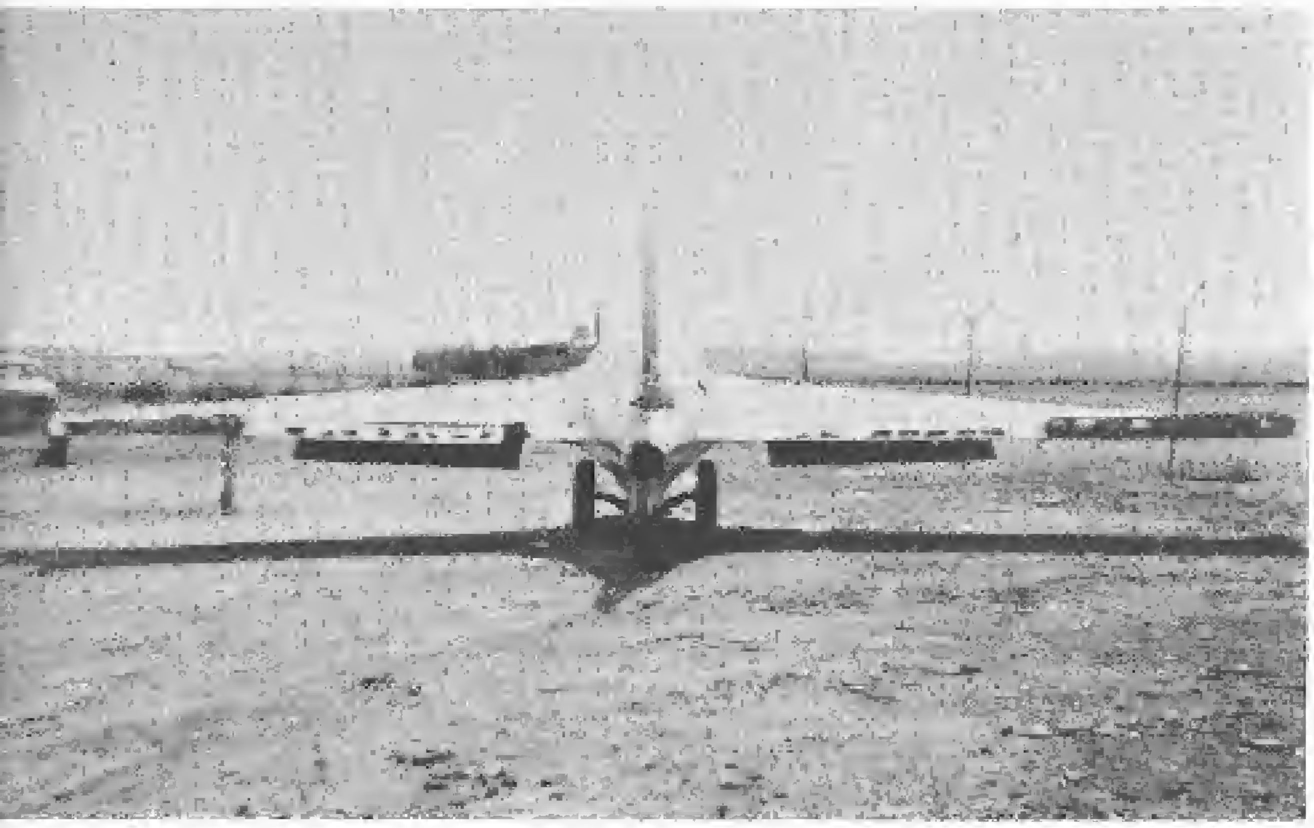


Messerschmitt Me-263 was known earlier as the Me-163D.



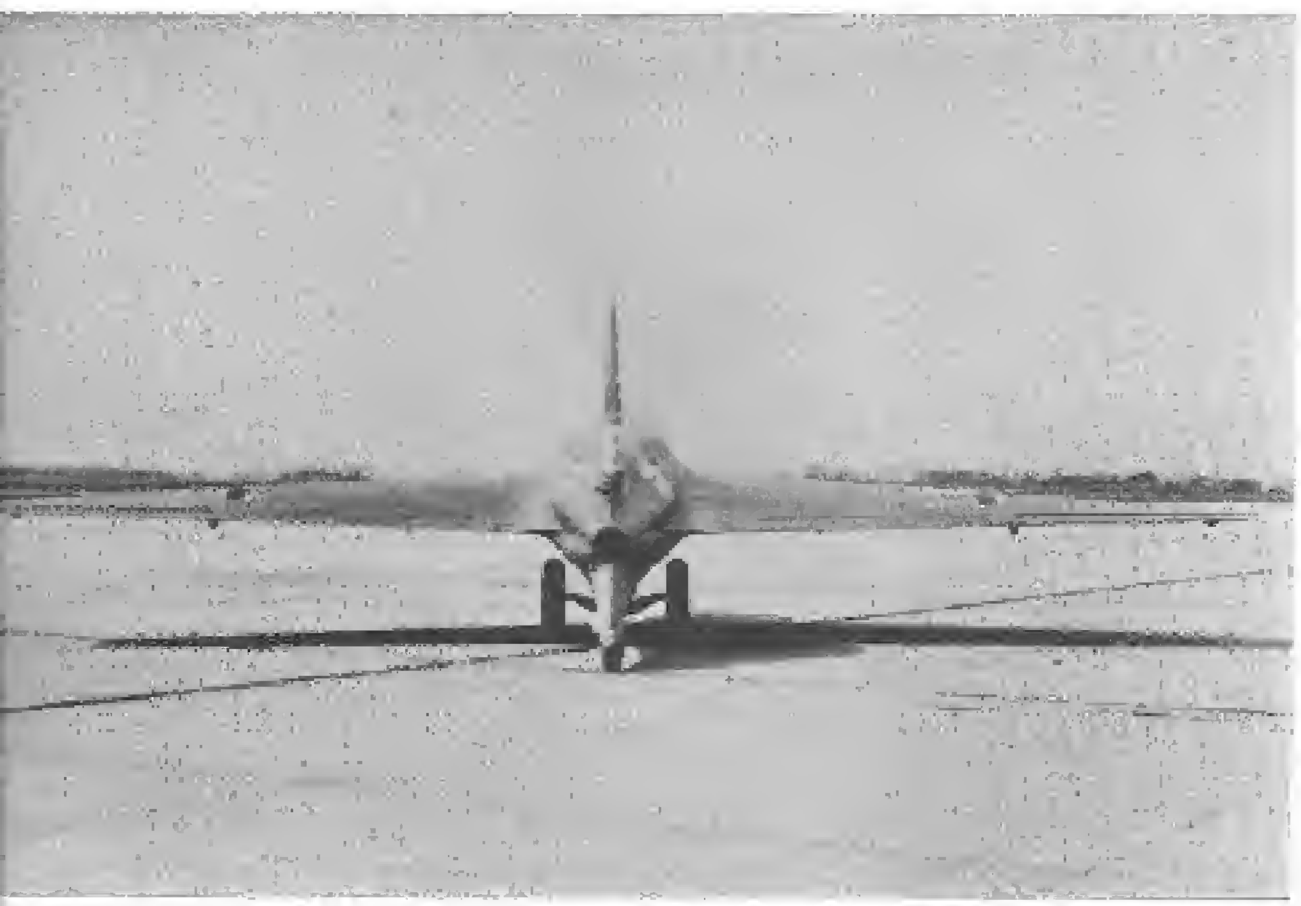
Me-163 V-21 at rest on apron. Most all test models of Me-163 were painted light gray and carried code letters and numerals. This one featured a white nose.

Head-on view of the unusual Me-163 V-33. Luftwaffe test pilots named it the "Kraftei" (Power Egg.) This view clearly shows the take-off dolly in the extended position.



Rear view of a captured Me-163B. This view shows the fabric covered control surfaces.

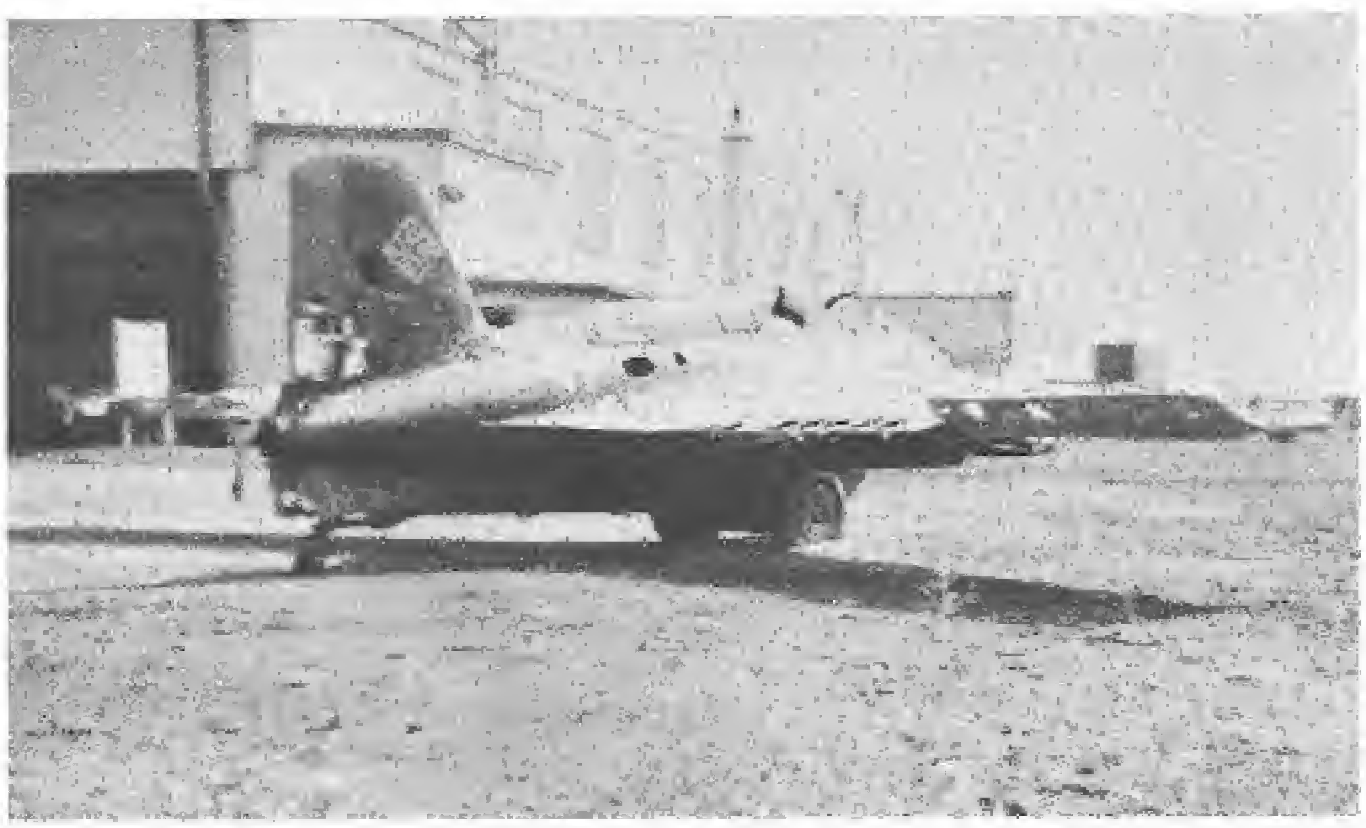
Head-on view of Me-163B with metal flaps extended. 90 mm armor glass in front of pilot provided frontal protection.



Me-163B FE-500 at Wright Field. Note the extremely small rear opening for the Walter 109-509A liquid fuel rocket engine of 3,750 lbs. thrust.

Me-163B Werk Nr. 191454. It was standard practice for pilots to jettison dolly after take off. If a malfunction occurred, pilots were ordered to jump.

This Me-163B "Komet" was assigned the foreign evaluation number FE-500. It was tested at Edwards Air Force Base following the war.



This captured Me-163B has been stripped by souvenir hunters. Note the two hatches on the upper turtle deck.

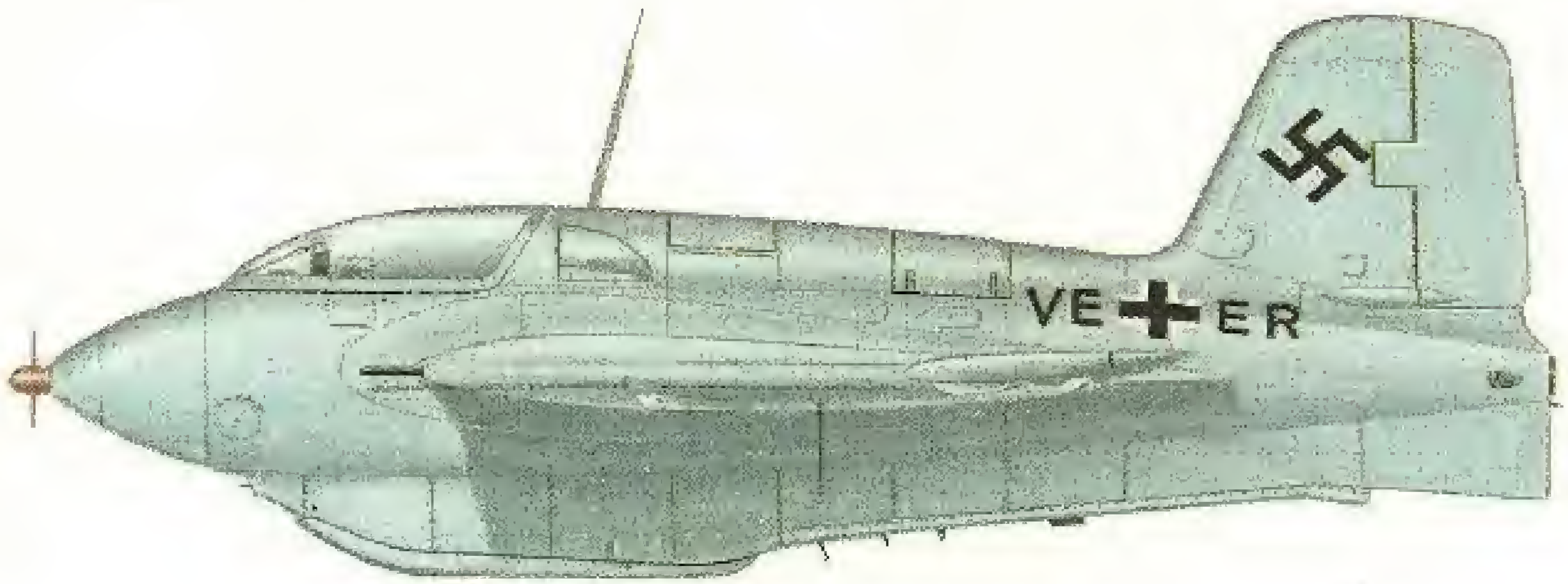
A captured Me-163B "Komet" Werk Nr. 191659 is shown on display at Farnborough, England after the war. Pilot hatch is open to show the 90mm thick bulletproof frontal glass. The "Komet" posed new problems in defending large bomber formations.

Me-163B FE-500 at Wright Field. All captured equipment imported to the United States were assigned Foreign Evaluation and later T-2 designations by the Army Air Force Technical Intelligence Group.

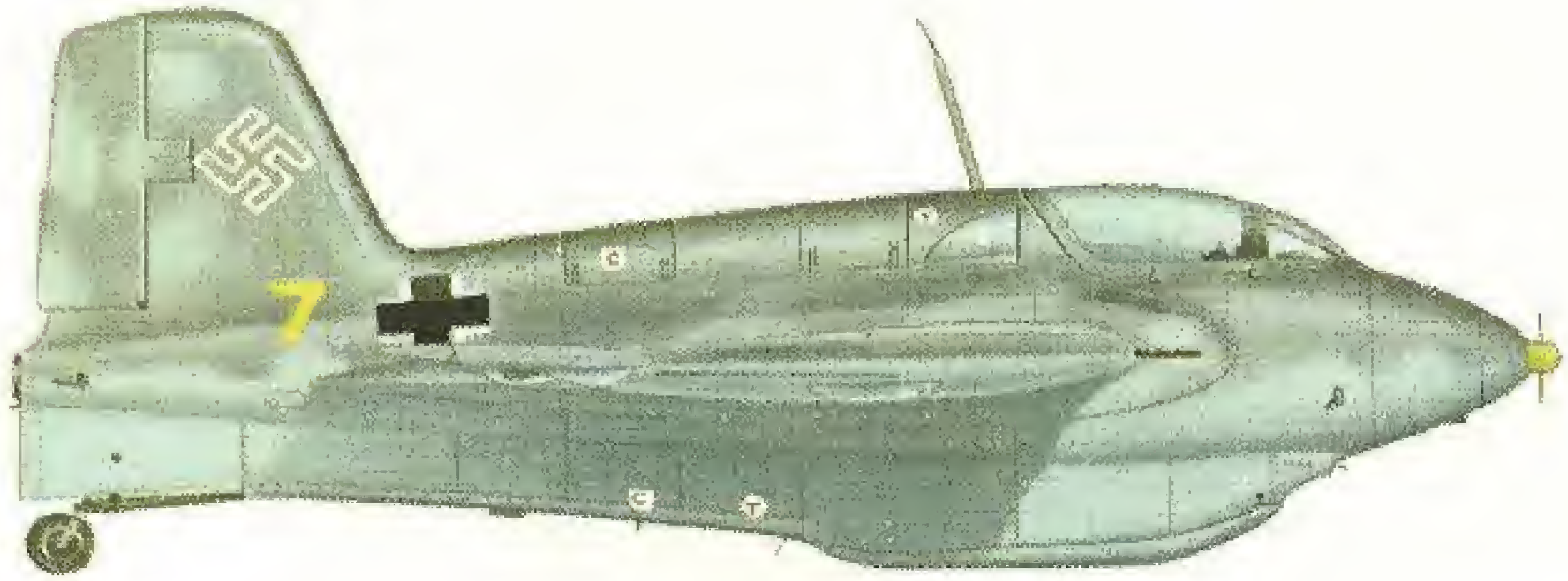
This Me-163B "Komet" FE-495 was in a display of captured German and Japanese aircraft outside Washington D.C. following the war.

Me-163B FE-495 was one of five captured "Komets" brought to the United States for examination. This aircraft was exhibited at a number of Air Force aircraft displays but was later scrapped.

MESSERSCHMITT ME 163 V8



MESSERSCHMITT ME 163 B-1



Scale 1: 48

UWE FEIST

MESSERSCHMITT ME 163 B-1 "KOMET"

Scale 1: 48

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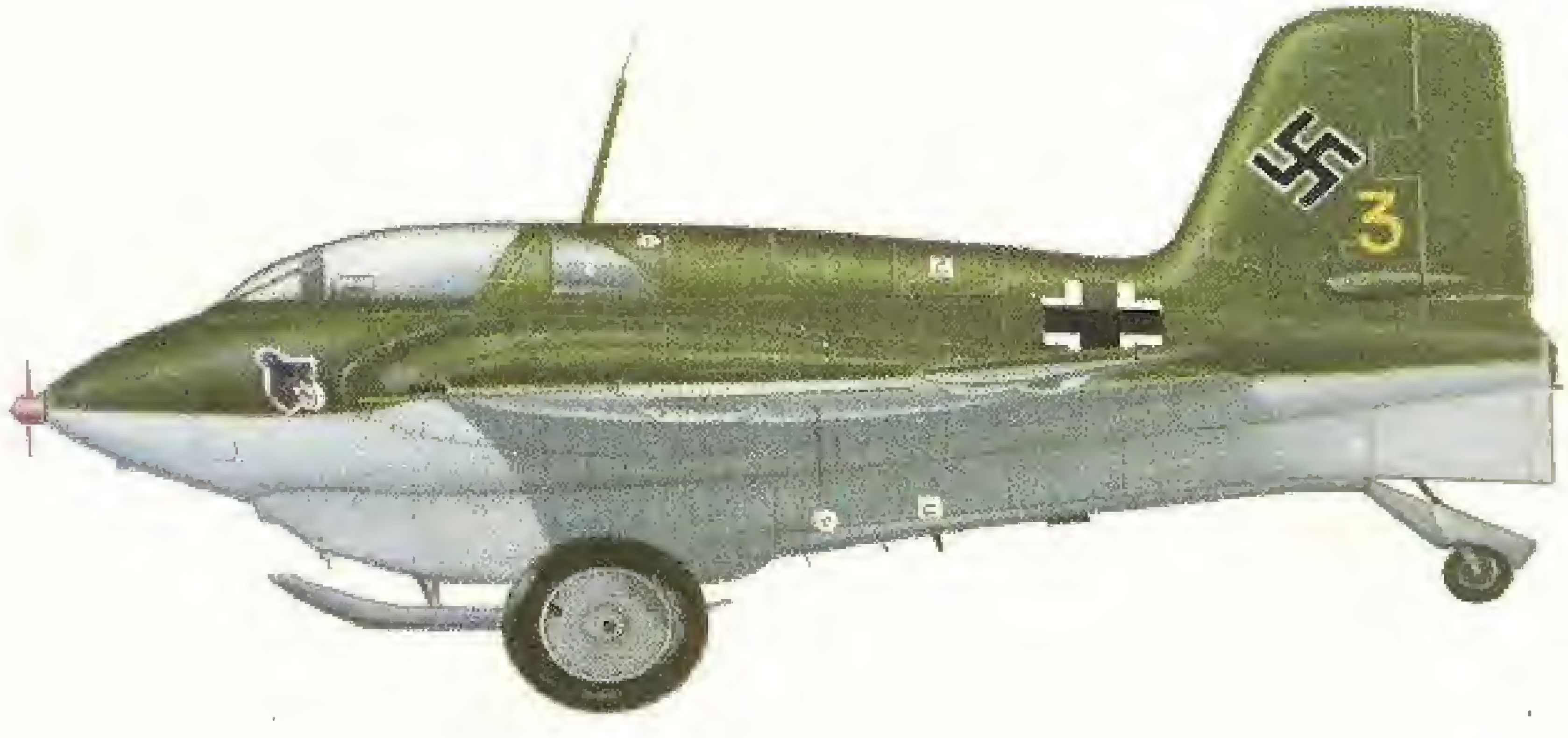
MESSERSCHMITT ME 163 B-0

MESSERSCHMITT ME 163 B-1
of 2. Staffel/Jagdgeschwader 200



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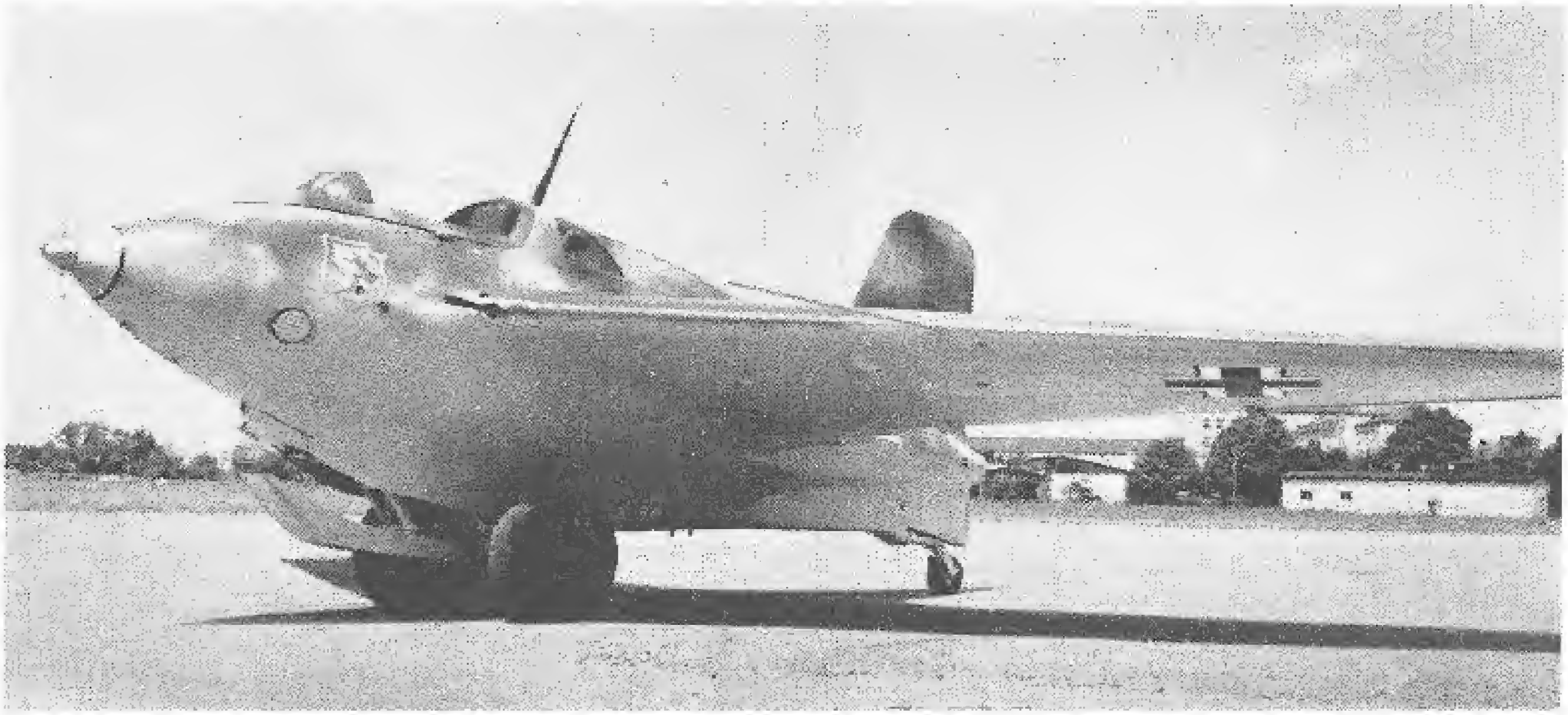


This Me-163B "Komet" was given to the Deutsche Museum in Munich, Germany, by the Royal Air Force in July 1965. Previous to this it had been on exhibit at the R.A.F. Base, "Biggin Hill."

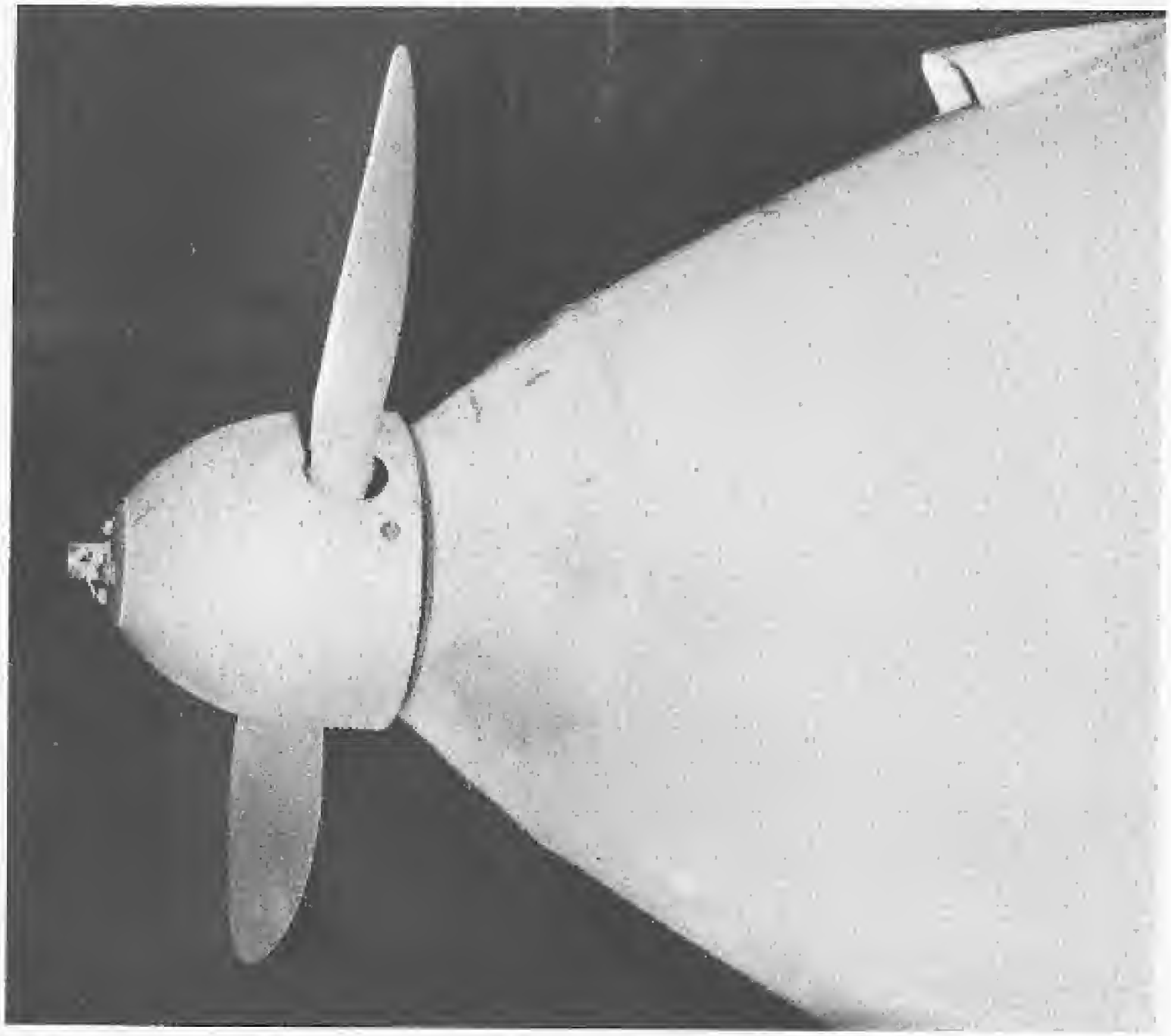
Pilot dons jacket after getting a cockpit check-out in Operational Me-163B at Brandis. Note the beautiful mottled camouflage on this "Komet."

Me-163B "Komet" Werk Nr. 191916 as restored by the Royal Canadian Air Force for their National Aeronautical collection at Rockliff, Ontario, Canada. Note the Baron Munchausen insignia on nose.

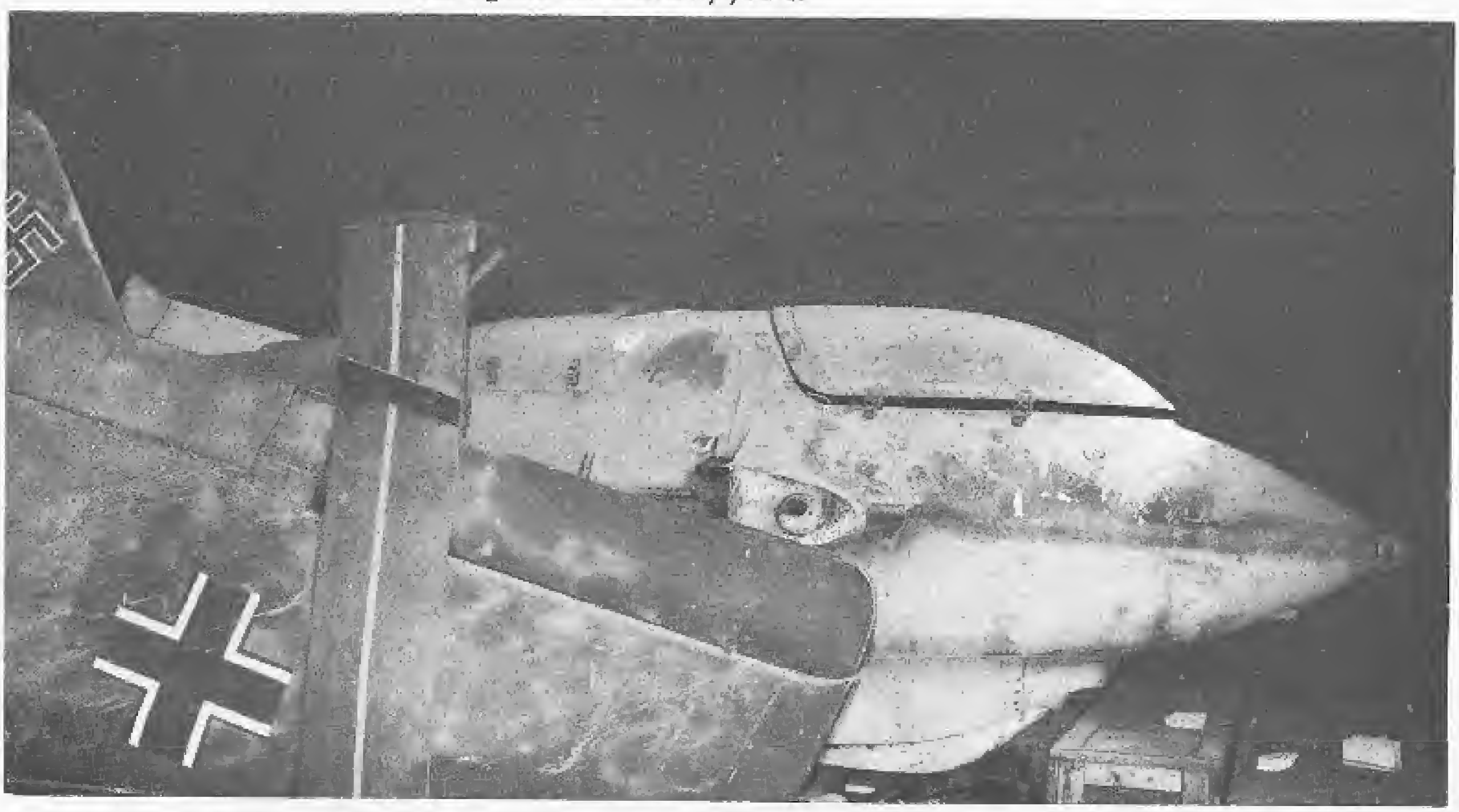
This R.C.A.F.'s Me-163B "Komet" is painted in the standard camouflage of light blue undersurface, dark green splinter on the upper surface and a mottled camouflage rudder.

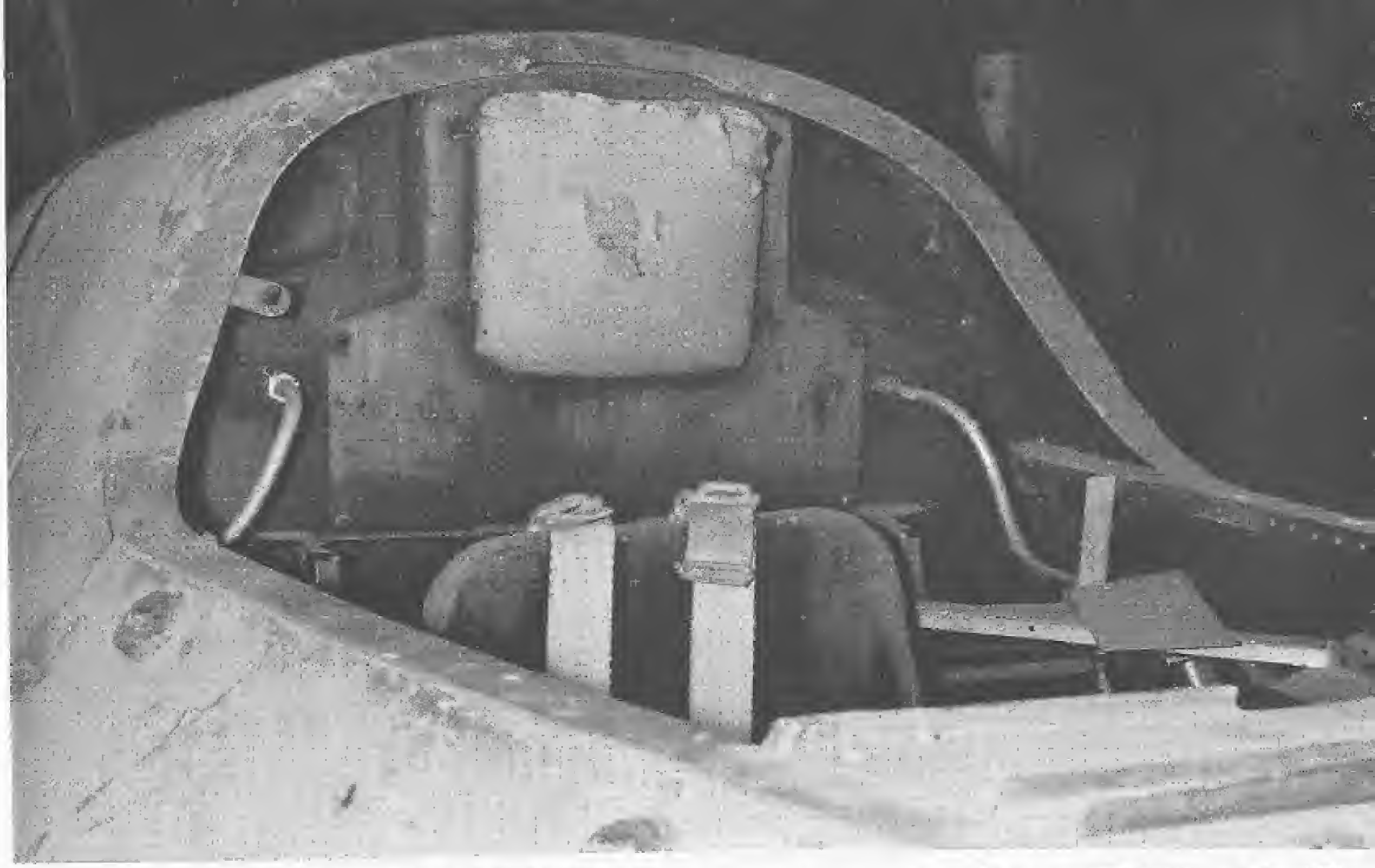
Me-163B "Komet" Werk Nr. 191904 on exhibit at Royal Air Force Base, Colerne. Note the clearly defined "T" Stoff and "C" Stoff liquid fuel markings.

Close-up detail of the Me-163B air-driven generator. Small frontal propeller was for generating electrical current to the "Komet's" electrical system.

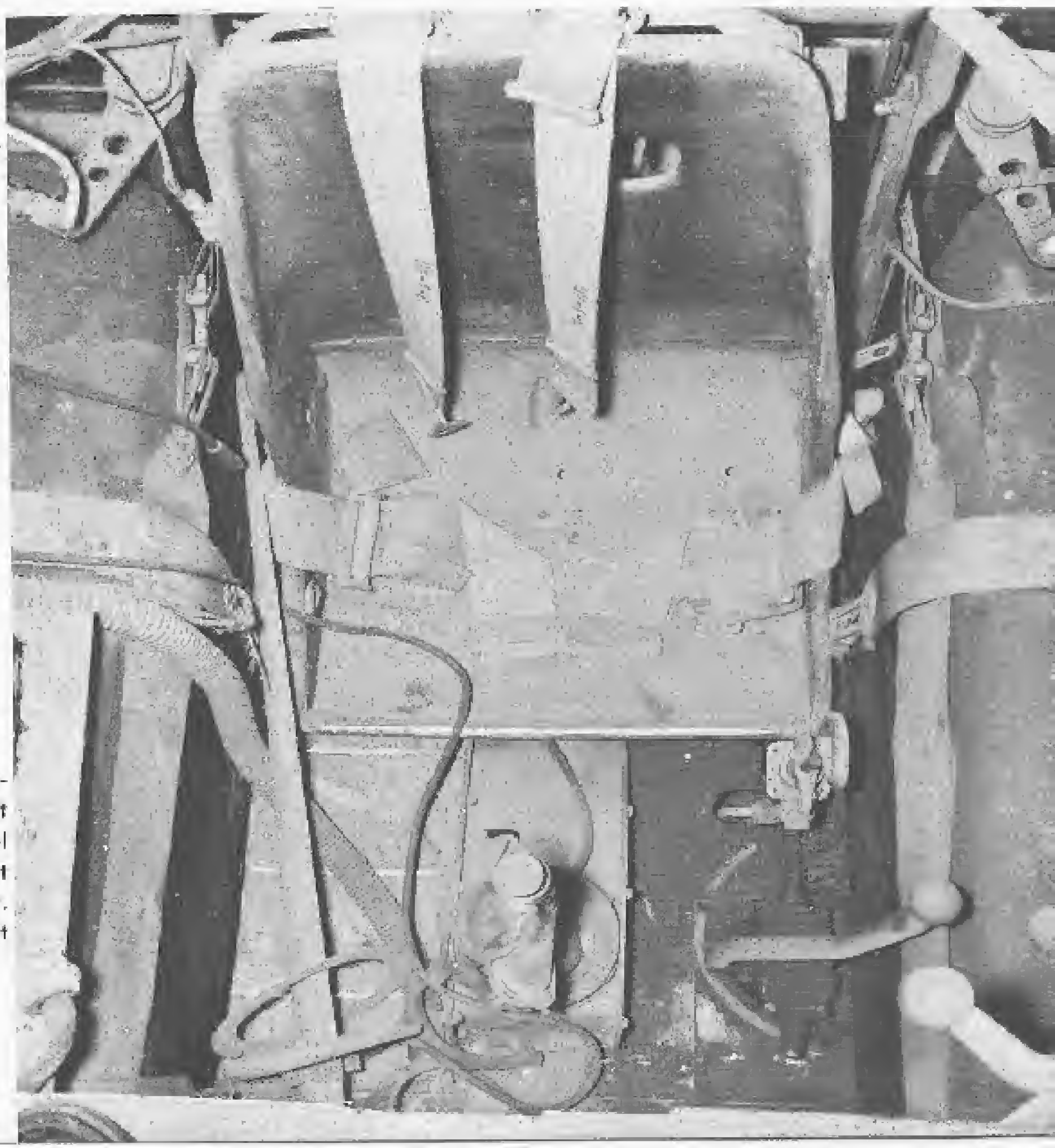


The sole remaining Me-163 "Komet" in the United States is held by the National Air Museum collection outside Washington D. C. Aircraft has been in storage for over twenty years.

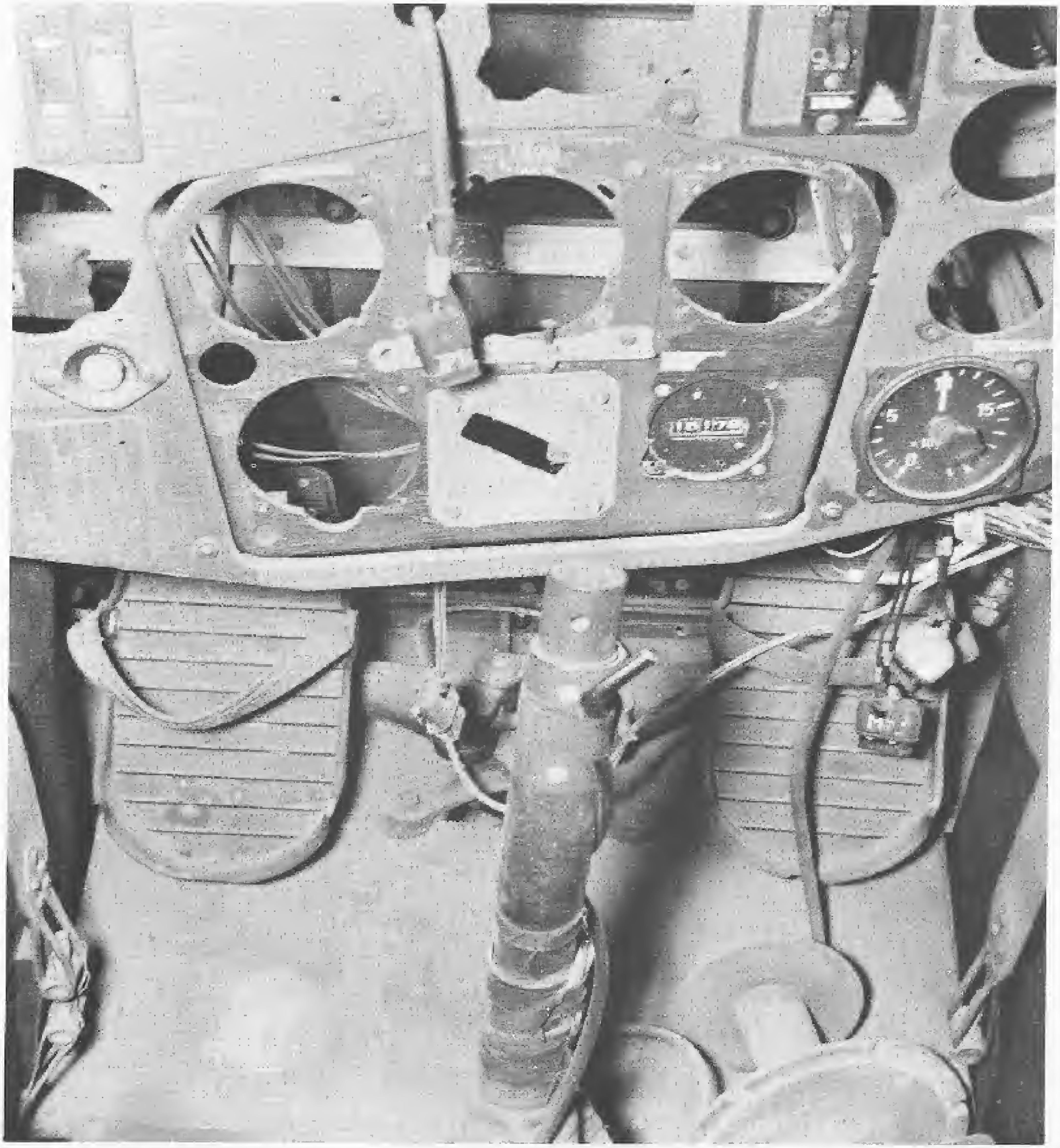




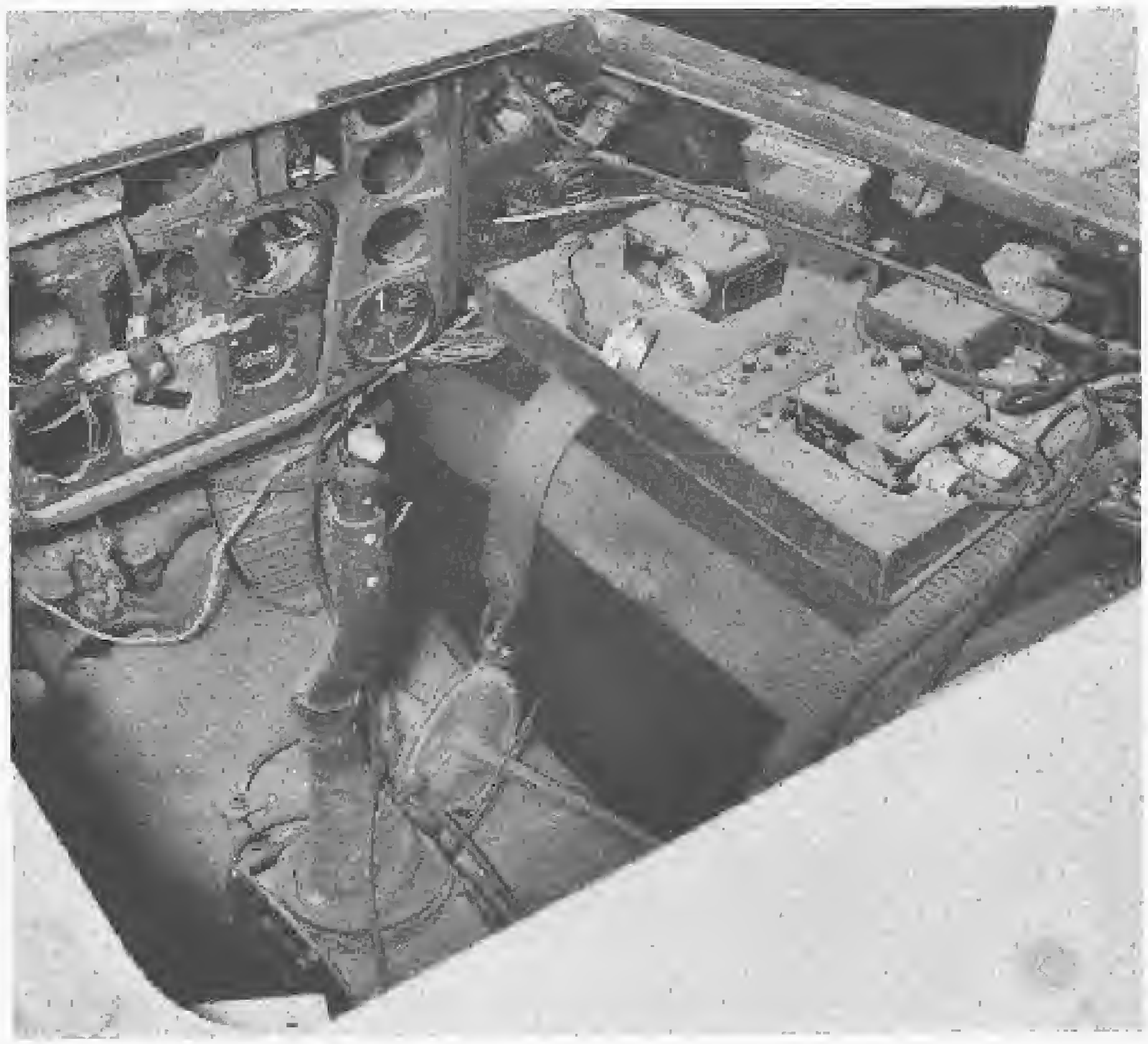
Interior details of Me-163B cockpit shows pilot's head rest on 13 mm thick armor plate at rear. Fuel lines at each side of pilot ran from cockpit fuel tanks aft to Walter 109-509 rocket engine.



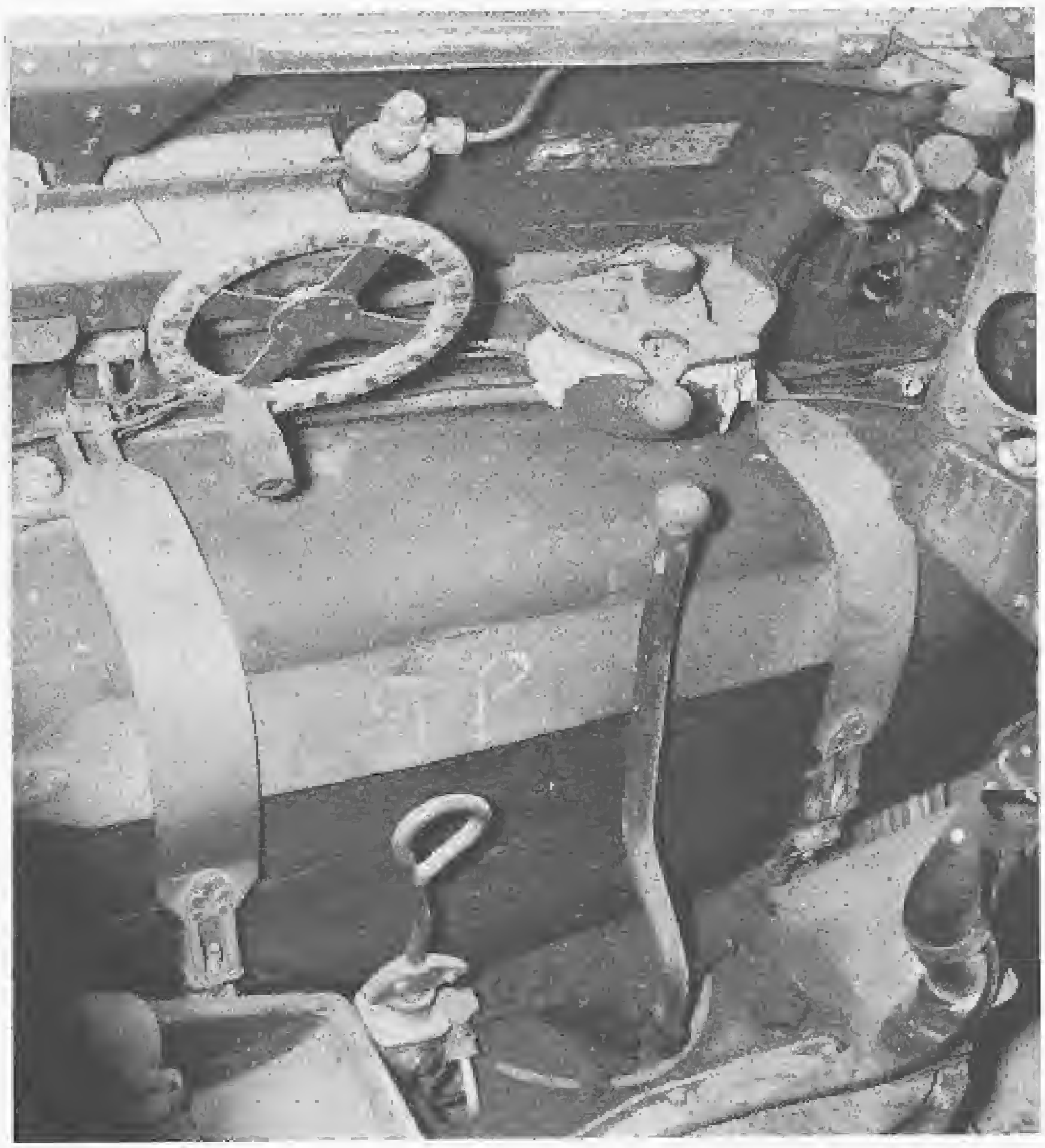
Looking down in cockpit of Me-163B. Pilot seat shows seat belt and harness locations. Saddle fuel tanks on each side. Canopy exit handle is in top left hand corner. Undercarriage release is just left of the pilot's seat.



"Komet" instrument panel after Army G.I.'s had gathered souvenirs. Center panel contained flight instruments: (L-R) rate of climb, turn and bank indicator, airspeed, and altimeter. Three small pressure gauges were mounted on the right side of the main panel. Outer left and upper center hole were cut in panel to install U.S.-made altimeter and airspeed instruments. Starter button is on left side. Note simple rudder pedals and bar controls.



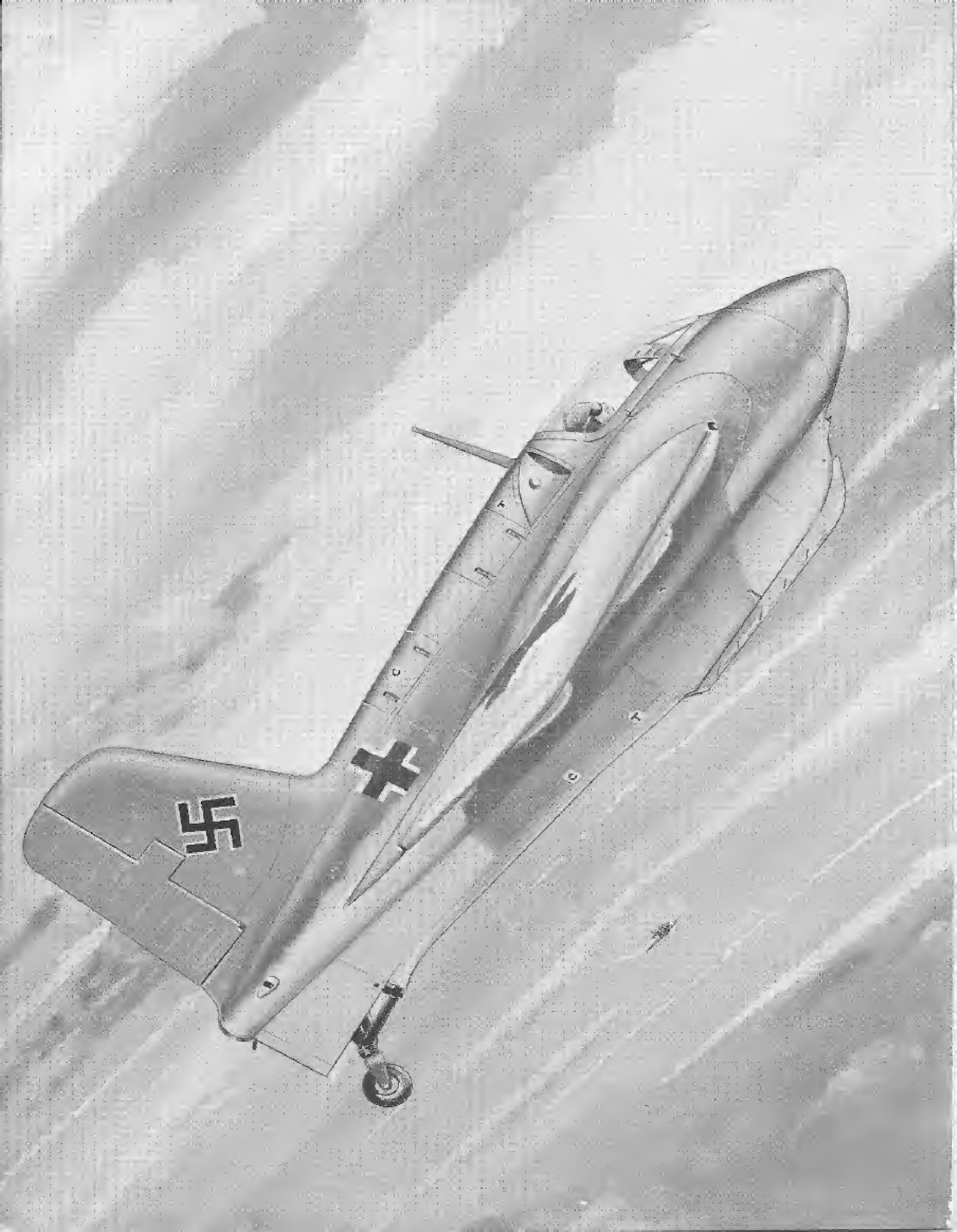
Right side console of Me-163B cockpit shows American radio equipment as installed for flight tests at Edwards A.F.B. Cockpit was small but adequate.



Left side console of Me-163B. Wing trim wheel is located upper left next to engine control. Take-off dolly release is by seat, canopy release lever is in upper right hand corner above landing skid release. Pump handle is located by fuel tank on floor.

A 30 mm MK-108 aircraft cannon was installed in each side of the "Komet's" wing root.

The armament installation as used in the "Komet" was compact but deadly. Each 30 mm MK-108 cannon could fire 60 rounds.



MITSUBISHI J8M1

Early in 1944, the Japanese trade commission in Germany received information from the host government about a new German rocket fighter capable of successfully intercepting approaching enemy bombers. The Japanese were told that this new fighter was exceptionally fast and had an amazing rate of climb. Best of all, though, was the remarkable news that no Allied fighter or bomber had a defense against it.

Naturally, the Japanese military mission became quite excited about the German Komet. So interested were they that they acquired one complete aircraft with rocket engine and purchased design rights for their government. The mission intended to transport the plane in one of the freight submarines which trafficked in exchange war supplies (German machine tools, armaments, and such, for Japanese crude rubber, quinine, etc.) between the two major Axis partners. In early 1944, then, the purchased Komet was put aboard a submarine destined for Japan, but it never docked at the Japanese base in Singapore. Its loss seriously interfered with immediate production plans.

Yokosuka MXY—8 and student pilot trainee.

Although the specimen Me 163B was lost at sea, a set of drawings did reach Japan in mid-1944, at which time the Japanese frantically went to work building a prototype model. Mitsubishi was responsible for constructing the airframe, with a man named Takahashi as chief project designer. The Japanese effort, named the Mitsubishi J8M1 "Shusui" or "Sword," resulted in several design changes over the German original, notably in the cockpit canopy and especially in the rocket engine. But the basic German aircraft shape remained mostly intact.

One of two Mitsubishi J8M-1 "Shusui" rocket aircraft brought to America. This is the sole remaining "Shusui" and is on exhibit at The Air Museum, Ontario, California.

On June 15, 1944, B-29 bombers, flying from bases in China, began the air war against Japanese cities with their attack on Kyushu. Spurred by this newest terror, rush priorities were assigned to speed up the development of the Shusui rocket fighter to repel the Superfortress attacks. Since the Japanese Navy had been charged with the defense of the Home Islands, the Shusui was obviously to be a Navy interceptor. However, it seems evident that the Army also took an interest in this new design, for it was allocated for Army use as the Ki-200; but no Army rocket planes flew before the end of the war.

Along with developing the airframe, the Japanese Navy also assumed the difficulties of engineering the rocket motor in the midst of deteriorating materiel supplies availability and testing delays which held up progress on the overall project. These problems were certainly bad enough, but Japan had never manufactured rocket fuels, and so, her general inexperience in this area caused her troubles to be twice as severe. And because the Shusui rocket flight program would require tons of special rocket fuel, uncertainty and doubt about whether the Japanese economy could afford to manufacture this expensive and volatile propellant worried many people in the government. But persistent and ever increasing B-29 attacks prompted certain influential Japanese leaders to push development.

Regardless, the Shusui prototype airframe was completed months before the rocket engine became available, and it was transported to Yokosuka Naval Base to await its motor. In the meantime, anticipating quantity production of the J8M1, many all-wood glider versions (the MXY-8) were built in order to step up pilot training.

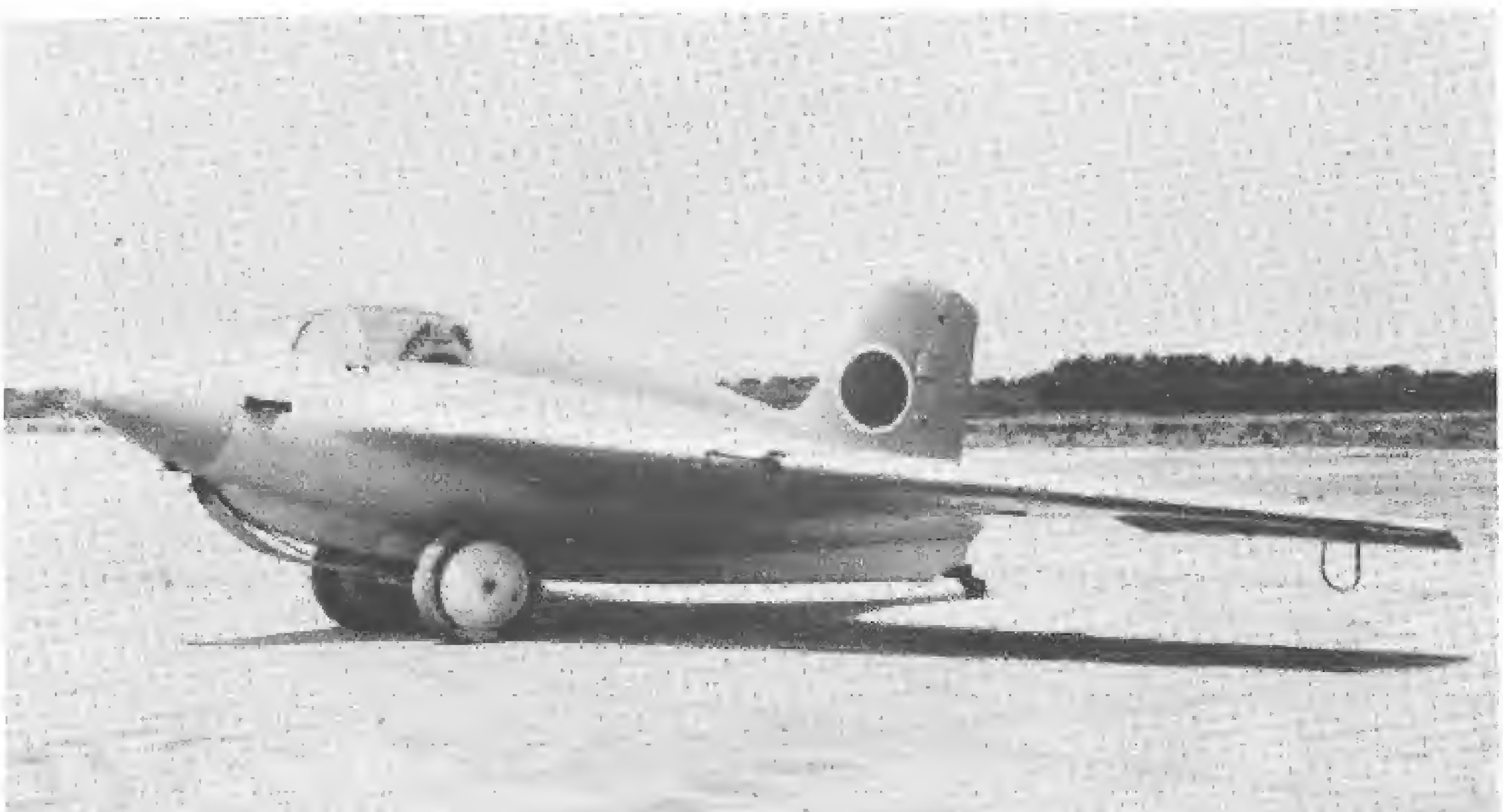
Eventually, in June of 1945, the Shusui got its engine, and after some final preparations, the J8M1 made its first flight on July 7, 1945, with Naval Lieutenant-Commander Inuzuka, official test pilot for the program, flying the mission. In order to permit a short take-off run on the small airfield at Yokosuka, the aircraft carried a light fuel load; but after a successful take-off, the on-board fuel supply shifted to the rear of the cells as the plane made its high angle climb for altitude. As a consequence, the fuel surface

level dropped below the engine outlet level and the fuel flow to the engine stopped a little above 1,000 ft. Commander Inuzuka immediately leveled off, jettisoned his remaining fuel and tried a descending turn in an effort to regain the airfield. His landing speed was too high, causing him to crash into a building at the end of the field and be killed. Later, investigation showed that fuel starvation to the engine caused the accident; as a result, the fuel system was redesigned.

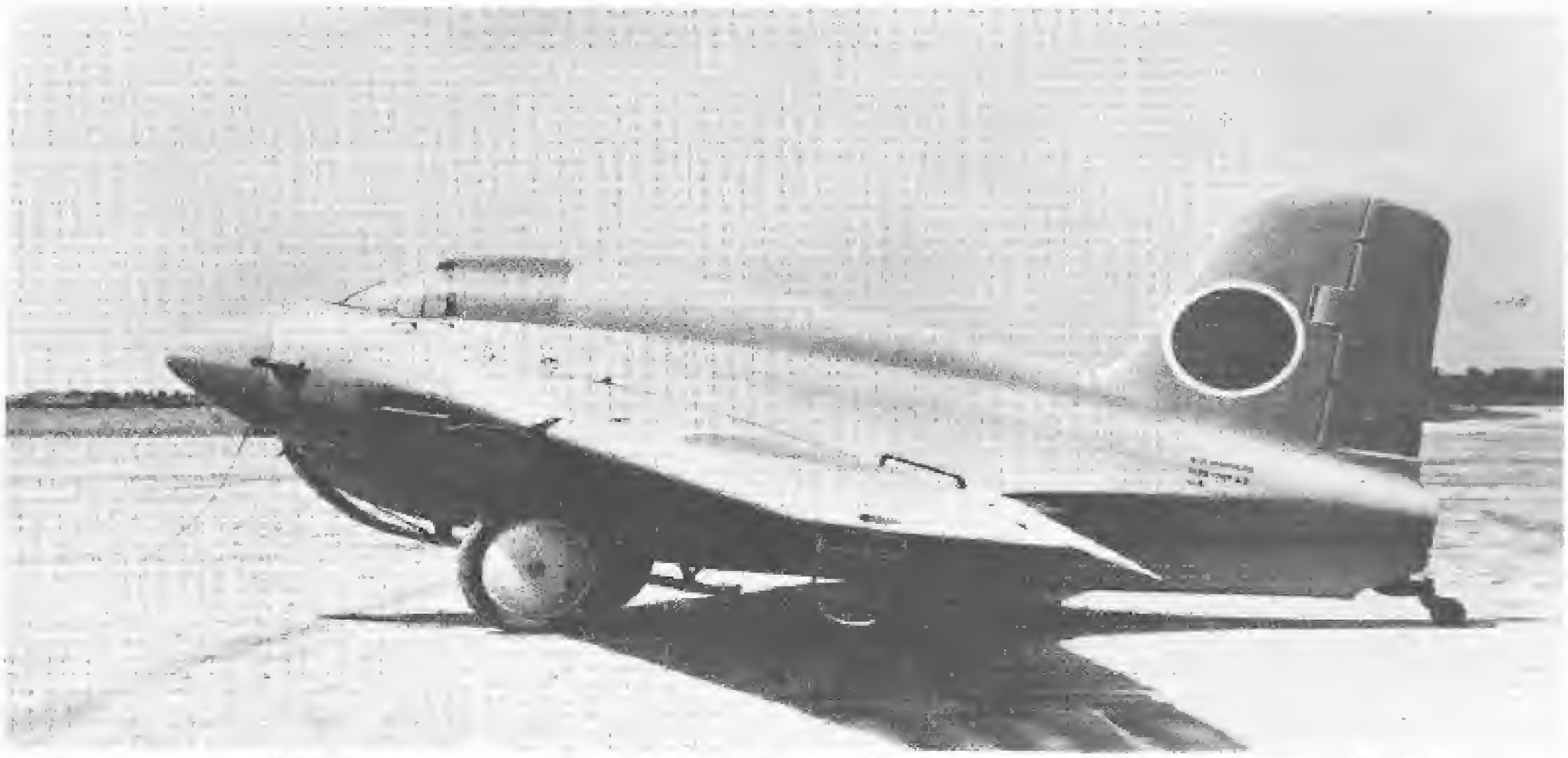
As for the Army's Ki-200, its engine was being installed in the second Shusui prototype at Kashiwa airfield when the Japanese surrendered to the Allies.

Even though successful tests of the Shusui aircraft were never completed, the Japanese had determined production plans and begun manufacturing. Production plans expected 155 aircraft by March of 1945, 1,300 by September and 3,600 by March of 1946, but incessant bombing constantly interrupted production, making it impossible to even come near the assigned quotas. Yet despite the bombing and the failure to complete tests at the time of surrender, approximately one dozen airframes sat on the Mitsubishi production lines at war's end. Of these planes, two were sent to the United States for study and evaluation — one went at the U.S. Navy and the other to the U.S. Army Air Force at Wright Field.

The U.S. Navy Shusui was investigated, then transferred to Glenview Naval Air Station, near Chicago. The U.S. Army Shusui was carefully studied at Wright Field, after which it was declared "excess" by the Technical Air Intelligence of the Army Air Corps. The plane, along with other captured enemy equipment was exhibited on a tour of West Coast cities until 1947 when it was placed in storage. In 1950, the Ontario Air Museum of California bought and saved the last Shusui so that, today, this Mitsubishi J8M1 rocket fighter can be seen in the aeronautical collection of the Air Museum.

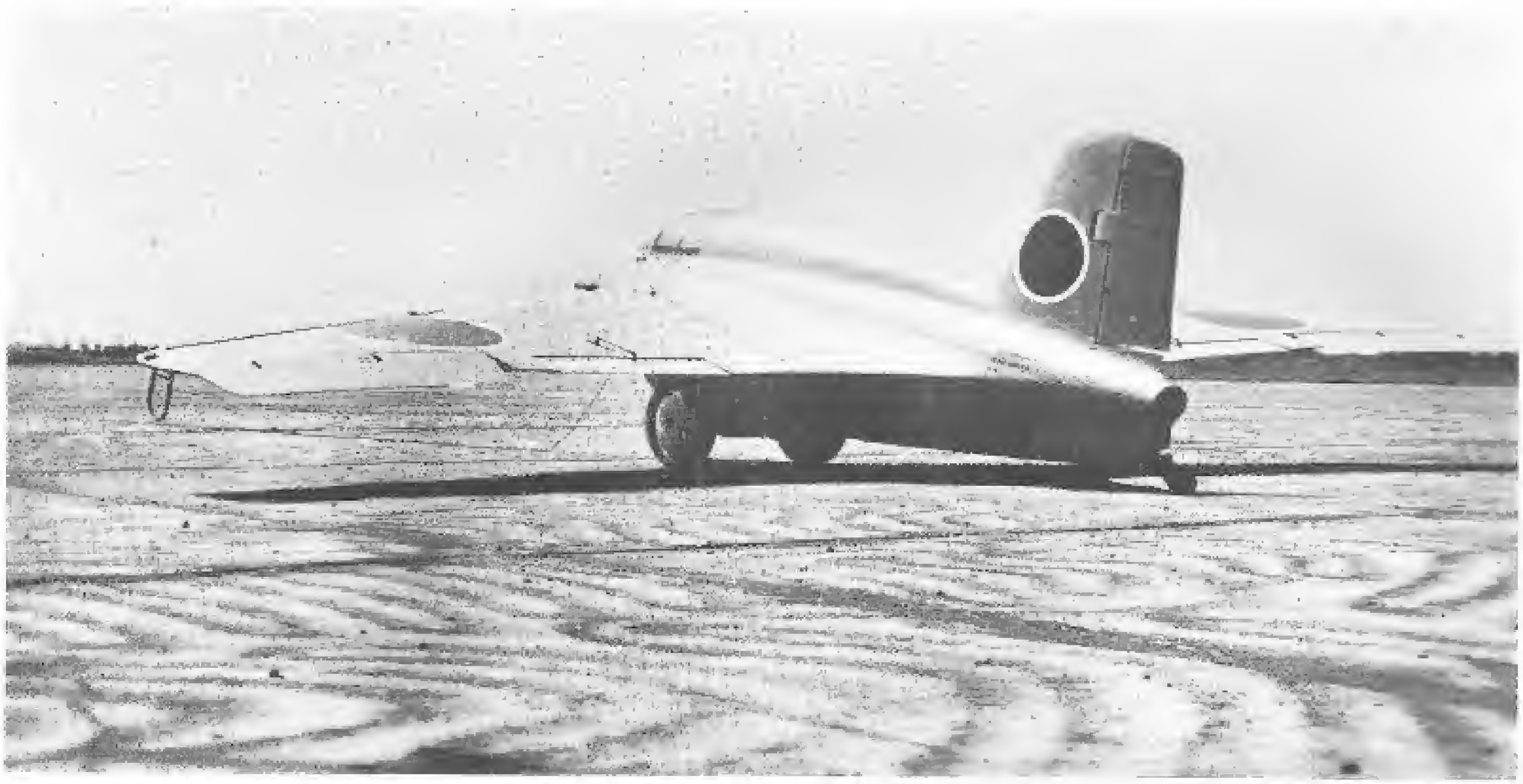


Approximately fifteen MXY-8 training gliders were manufactured by Yokosuka to permit pilot training during delays of "Shusui" aircraft production.



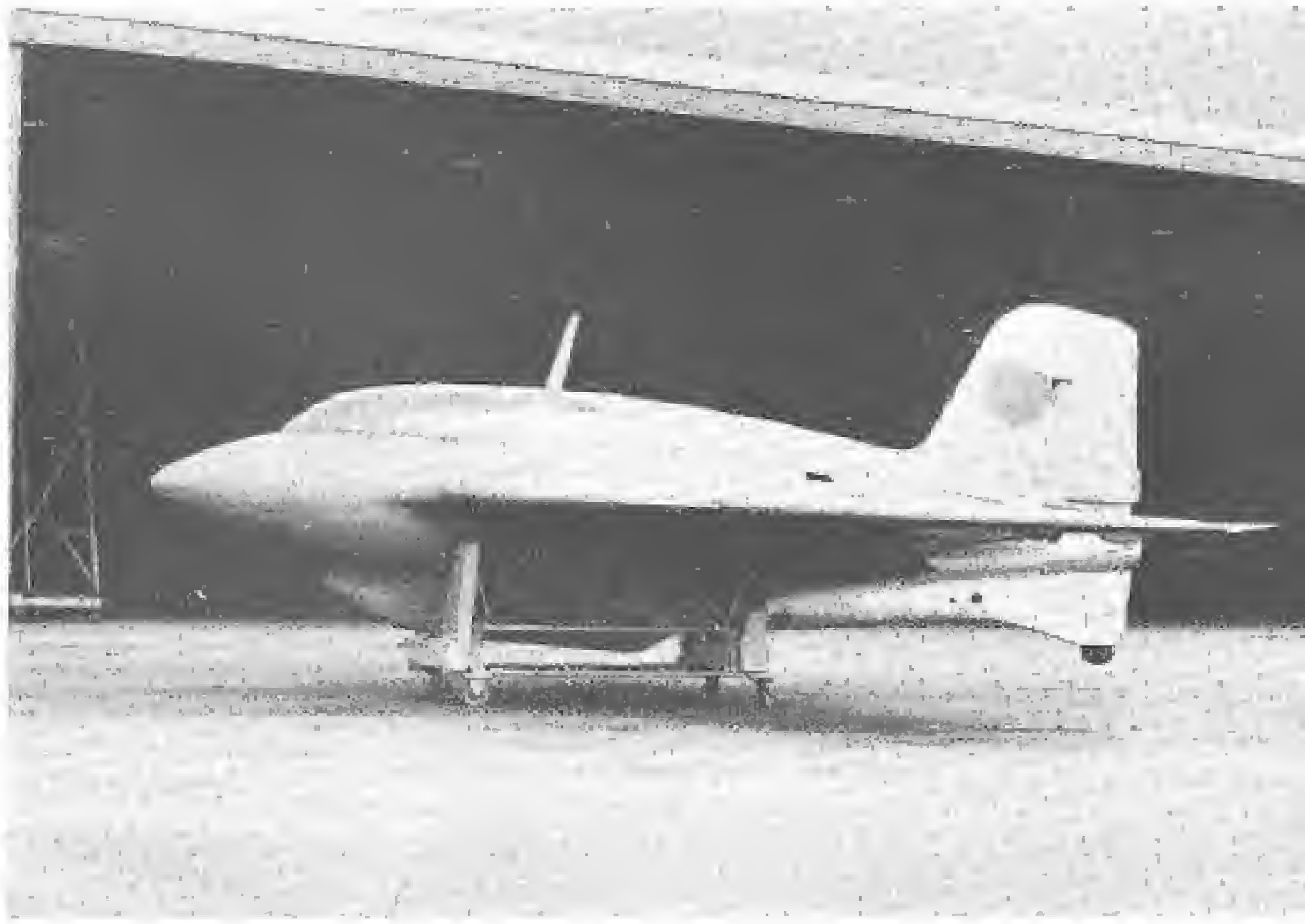
The Yokosuka MXY-8 was made of wood and fabric. These aircraft were unpowered gliders. They were towed aloft by parent aircraft where the tow line would separate and the pilot would gain valuable flying experience in this tail-less design.

MXY-8 with its tow line layed out on field ready for training flight. Showa L2D (C-47) aircraft were used as tow airplanes.



Two Yokosuka MXY-8 gliders at Japanese Naval Airfield on Honshu.

Mitsubishi J8M-1 "Shusui" sits outside hangar on portable dolly.

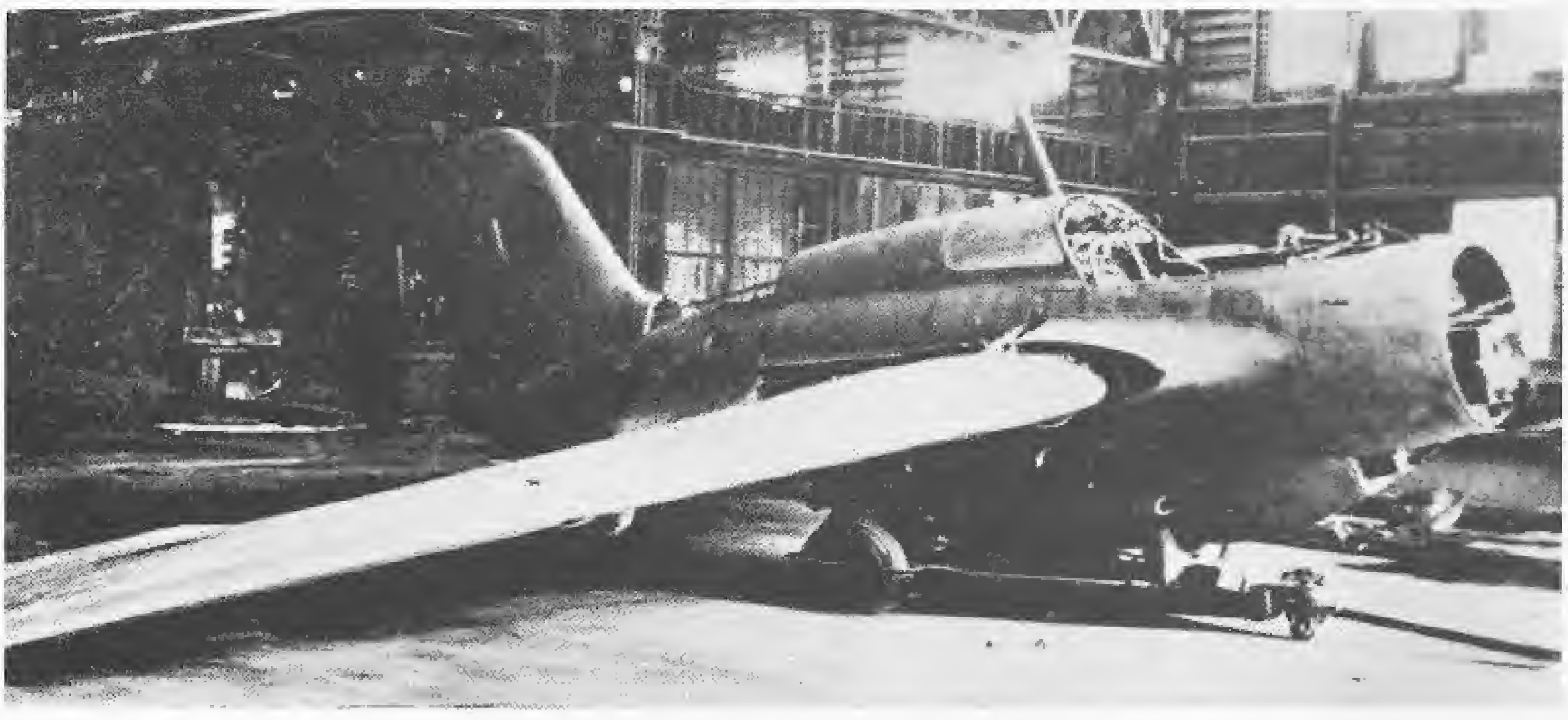


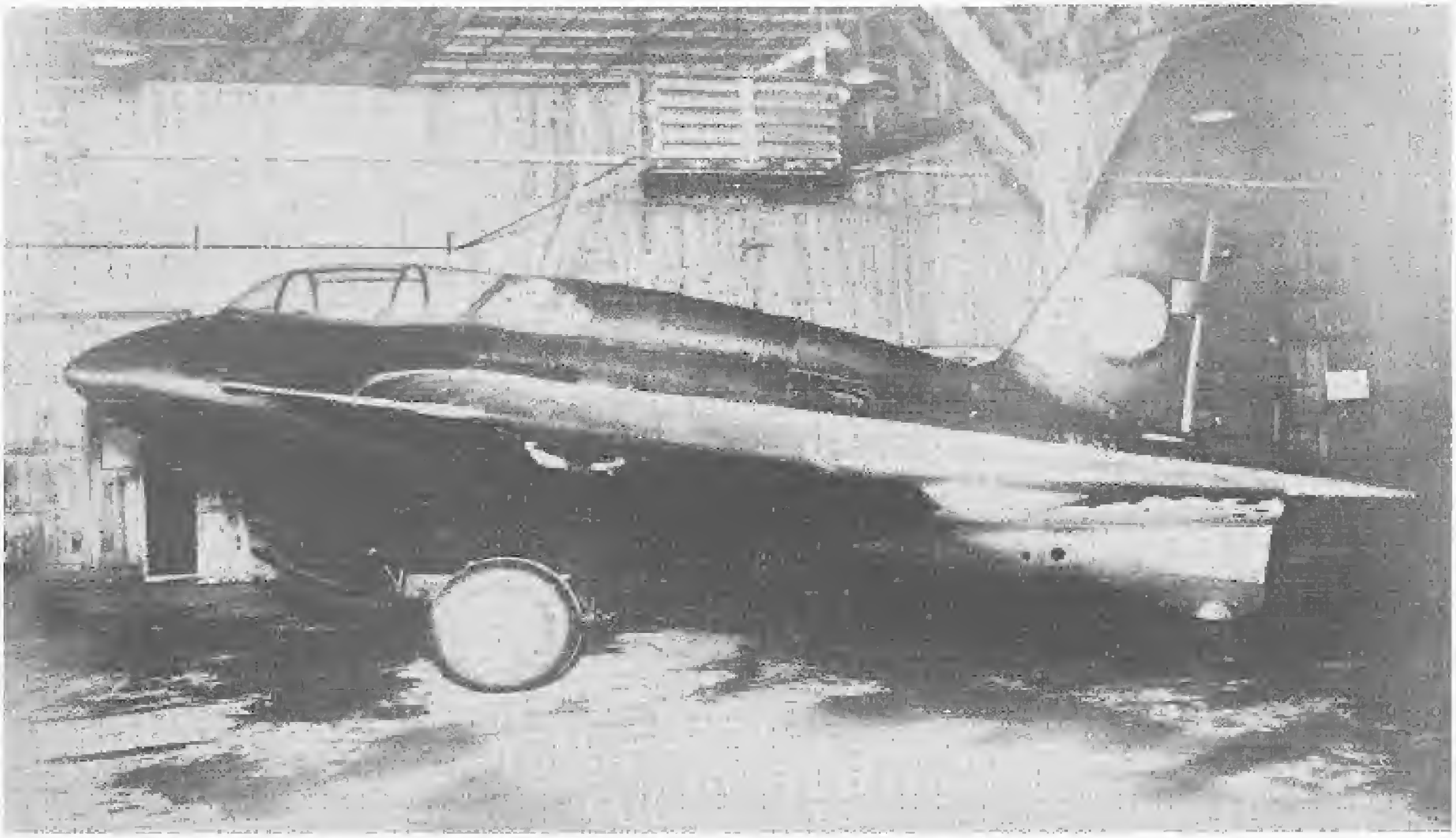
The second of two J8M-1 "Shusui" aircraft brought to the United States. This one is shown alongside Nakajima Ki-106 "Frank."

Remains of J8M-1 "Shusui" at the U.S. Naval Base at Glenview, Illinois.

Unfortunately many valuable aircraft met such a fate following World War II.

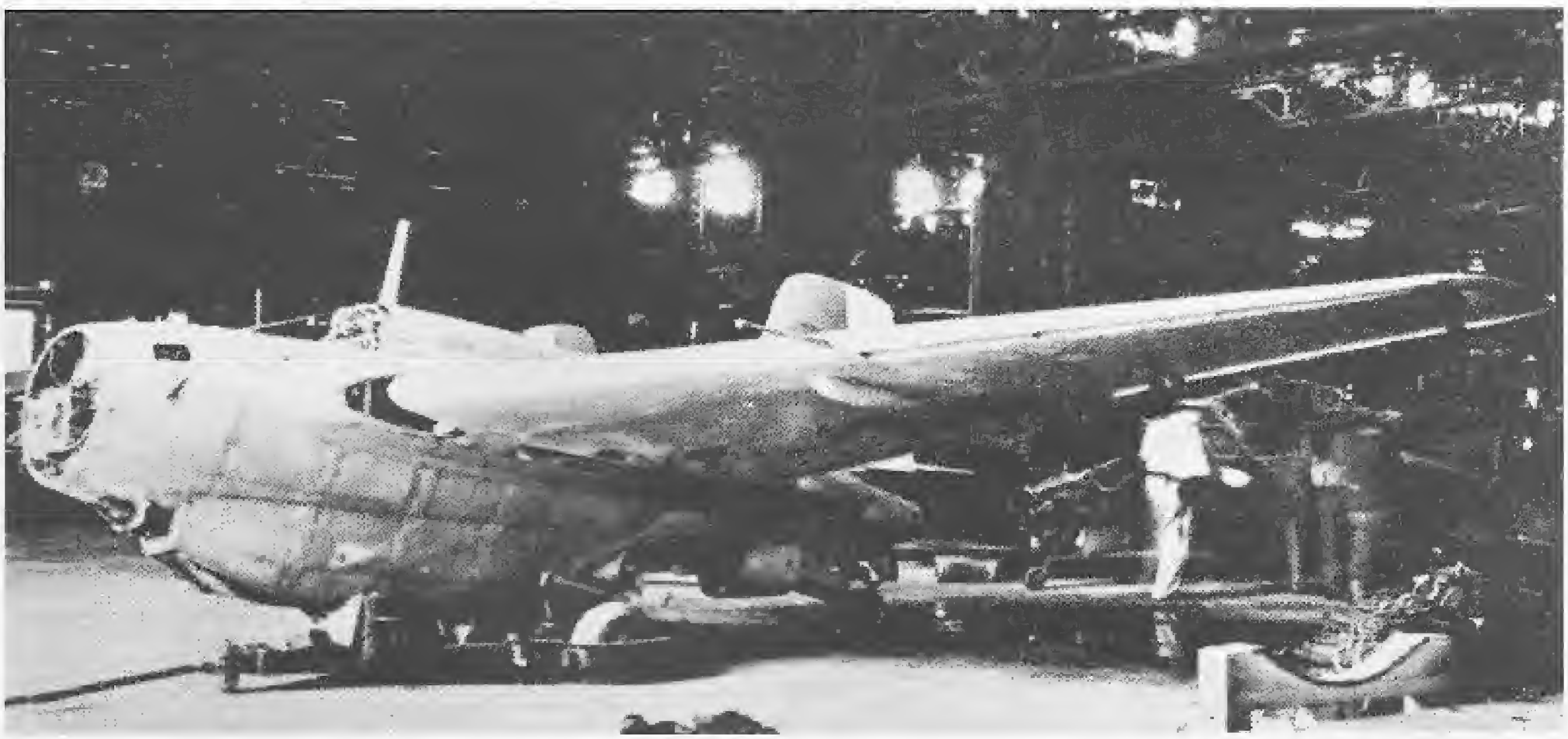
J8M-1 "Shusui" in the Mitsubishi factory awaits completion.

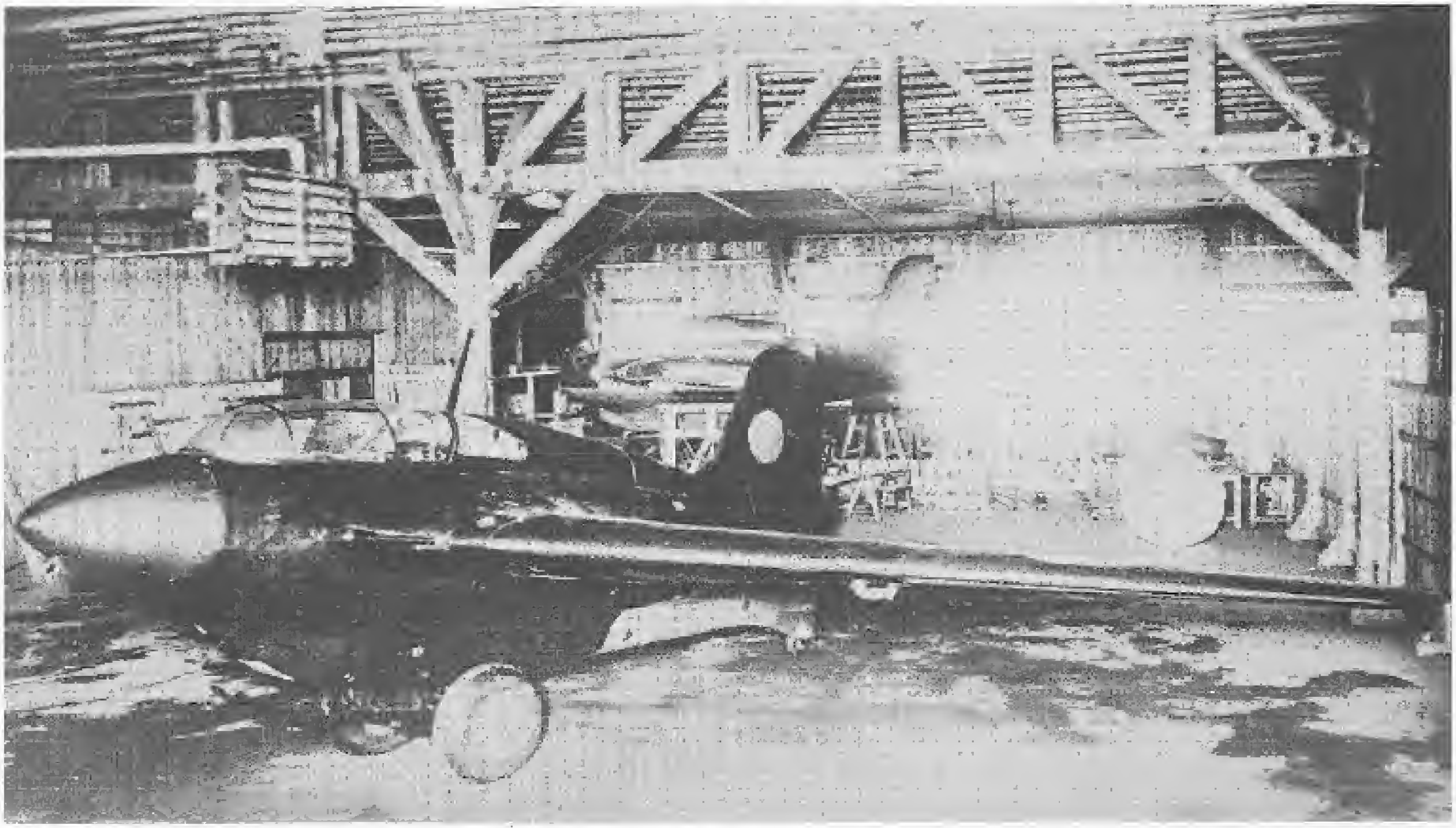




Prototype J8M-1 "Shusui" awaits rocket engine installation at Yokosuka, Japan.

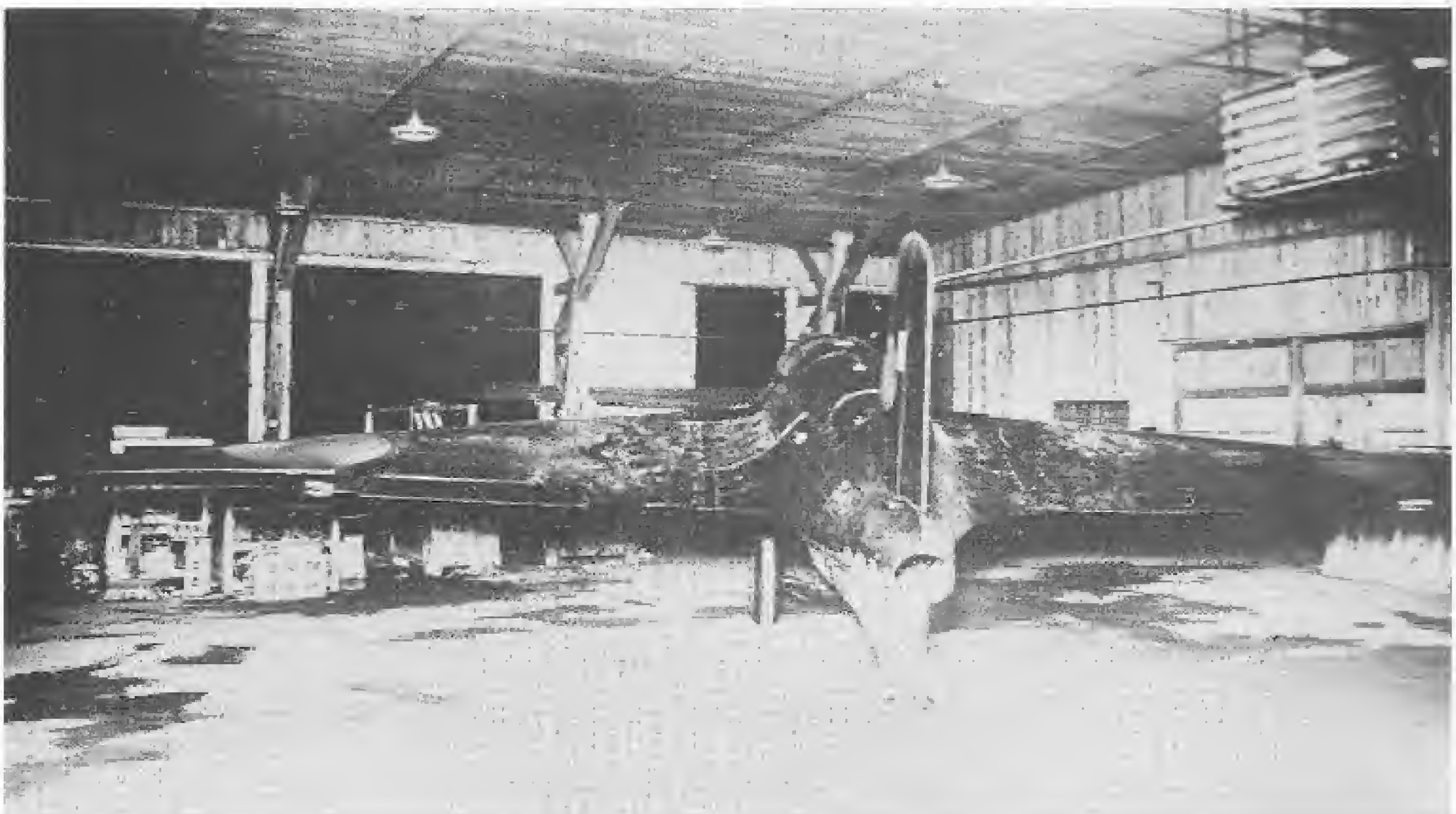
When U. S. Navy Intelligence men found the Shusui production line they were completely astounded by its design and appearance.





The prototype J8M-1 was destroyed on its initial test flight when Commander Inuzuka ran out of fuel and crashed upon landing.

The "Shusui" prototype airframe was completed months before the bi-fuel rocket engine was ready.

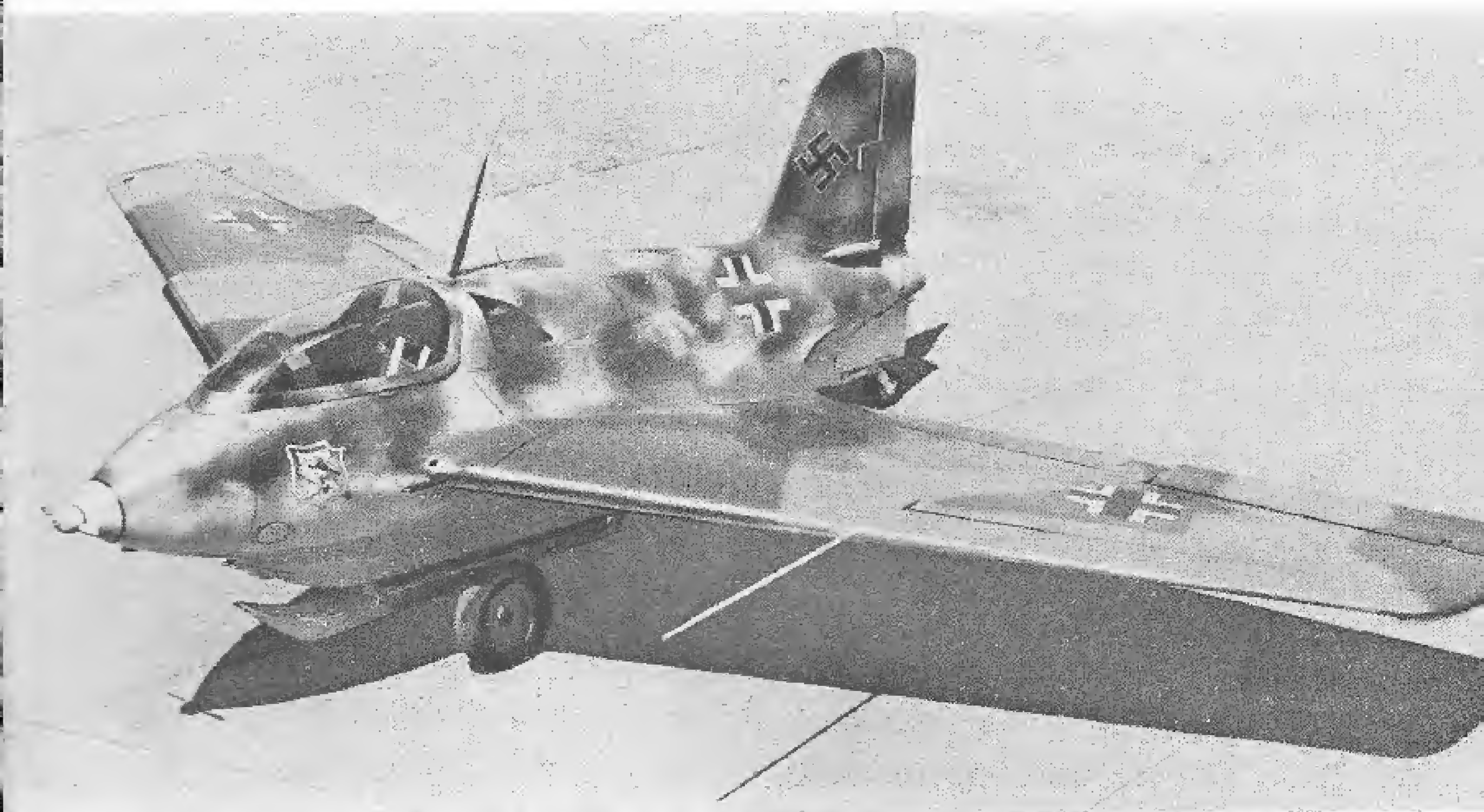


REMAINING ME 163B Komets

Of the three hundred and seventy odd Me 163B Komets manufactured during World War II, less than a dozen remain. After the war, five complete aircraft with spares were shipped to the United States for evaluation and study; however, only two were in really excellent condition. Dr. Lippisch and Rudolph Opitz both accepted invitations to assist in a test program worked out at Wright Field. Initially, Opitz was scheduled to fly one of the captured Messerschmitts, but he was later replaced by Herr Vogel, a former Luftwaffe pilot.

All five Komets were given "Foreign Evaluation" numbers: FE-495, FE-500, FE-501, FE-502 and FE-503. The last two aircraft, FE-502 and FE-503, were dissected and used to test various systems of the Me 163 at Wright-Patterson Air Force Base test laboratories. During August 1945, the FE-495 and FE-500 were transferred to Freeman Field in Seymour, Indiana, where the Komet flight test program began on October 5th. Of the two transferred aircraft, the FE-500, which was in better condition, was selected as first test vehicle. Actual flying was to be done at Muroc Flight Test Center (now Edwards Air Force Base), and the Komet was flown there on April 14, 1946, aboard a C-82 "Flying Boxcar." Shortly thereafter, Dr. Lippisch and test pilot Vogel arrived to make the necessary and preliminary inspections. The Germans spent two days making adjustments and repairs, and by the first of May, 1946, all was ready for the scheduled air flights.

One-and-a-half tons of fuel had been requisitioned from the Navy, or otherwise secured from civilian agencies, but first flights were to be glides, the plane being towed to altitude by a B-29 Superfortress. On May 3, 1946, an attempted take-off from a dry lake bed failed because the tow rope accidentally released too early. (A faulty release mechanism caused the trouble.) As a result, the Komet landed badly, causing damage to its airframe.



Me-163B "Komet" fully restored was presented to the Deutsche Museum by the Royal Air Force in 1965.

The damaged aircraft needed repairs, but required spare parts never arrived; consequently, it was decided not to proceed with further tests. The abortive flight testing ended with the FE-500 being placed in temporary storage.

A year later and for two succeeding years, 1947-1949, Komet FE-495 served in a United States Air Force recruitment effort and for other public displays. It was later scrapped.

In the summer of 1954, the FE-500 was transferred from storage at Norton Air Force Base to the National Air Museum, Silver Hill, Maryland, where it remains in storage and obscurity.

The remaining three captured Komets disappeared; presumably, these have been scrapped.

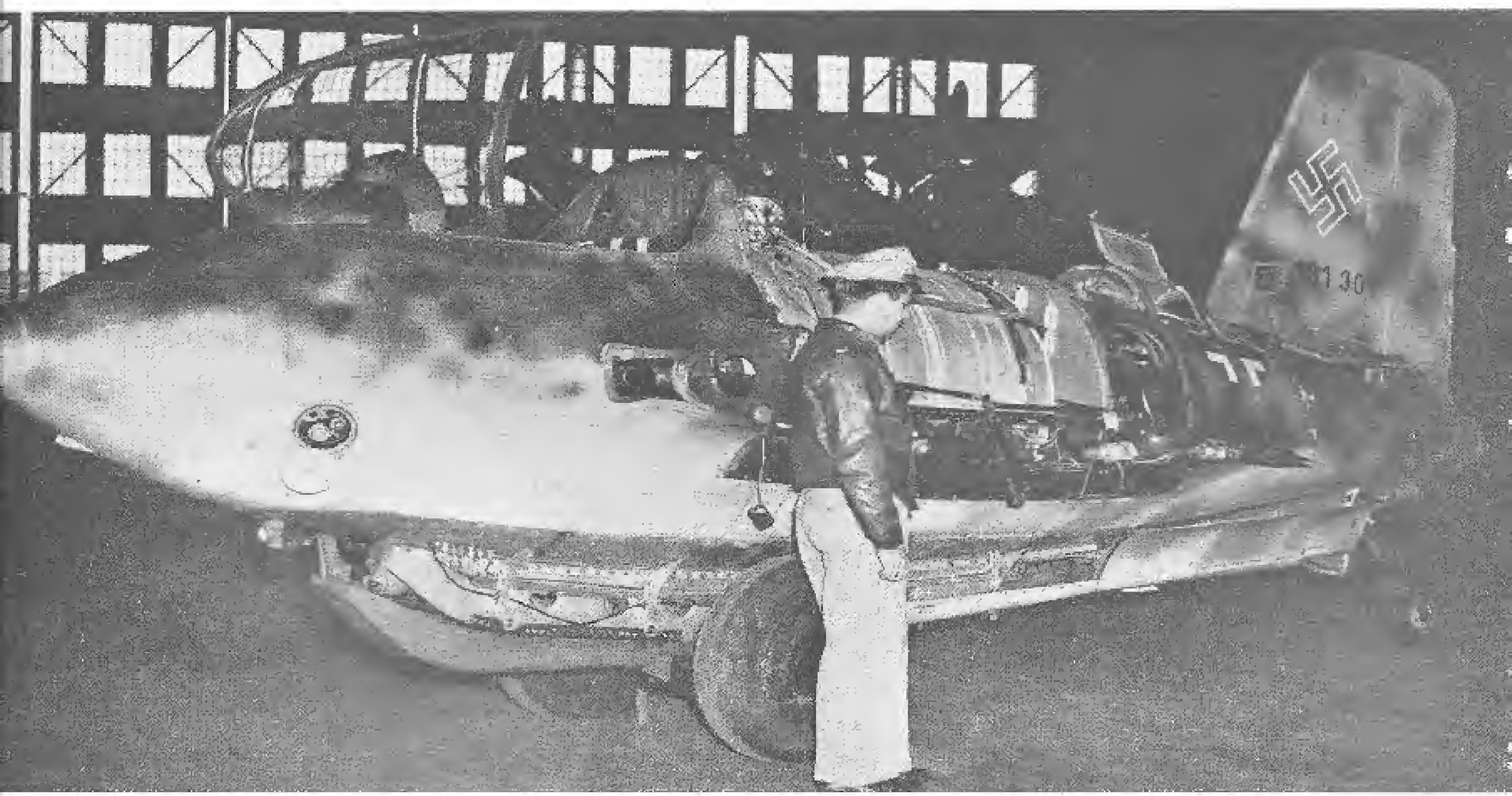
England owns the largest number of remaining Me 163 aircraft: the Science Museum and the Imperial War Museum have one each, as do the College of Aeronautics and the Royal Air Force Station at Colerne.

In the British Commonwealth nations, two Komets are in Canada: the Canadian National Aviation Museum in Ottawa has a fully restored airplane while the other is in storage with the Royal Canadian Air Force.

After the war, an Me 163B was sent to Loverton, Australia, but its whereabouts is unknown at present. It is believed to have been scrapped along with other captured wartime aircraft.

Finally, in 1965, the Royal Air Force presented one of their captured Komets to the Munich Museum, where it has been carefully restored and put on display.

Certainly, because this aircraft proved so spectacular, many were confiscated by the victors of the European War. These remaining Komets fascinate us, even today, being proof of the advanced German aircraft technology during the World War II era — an astonishing effort of many people whose names history does not know.



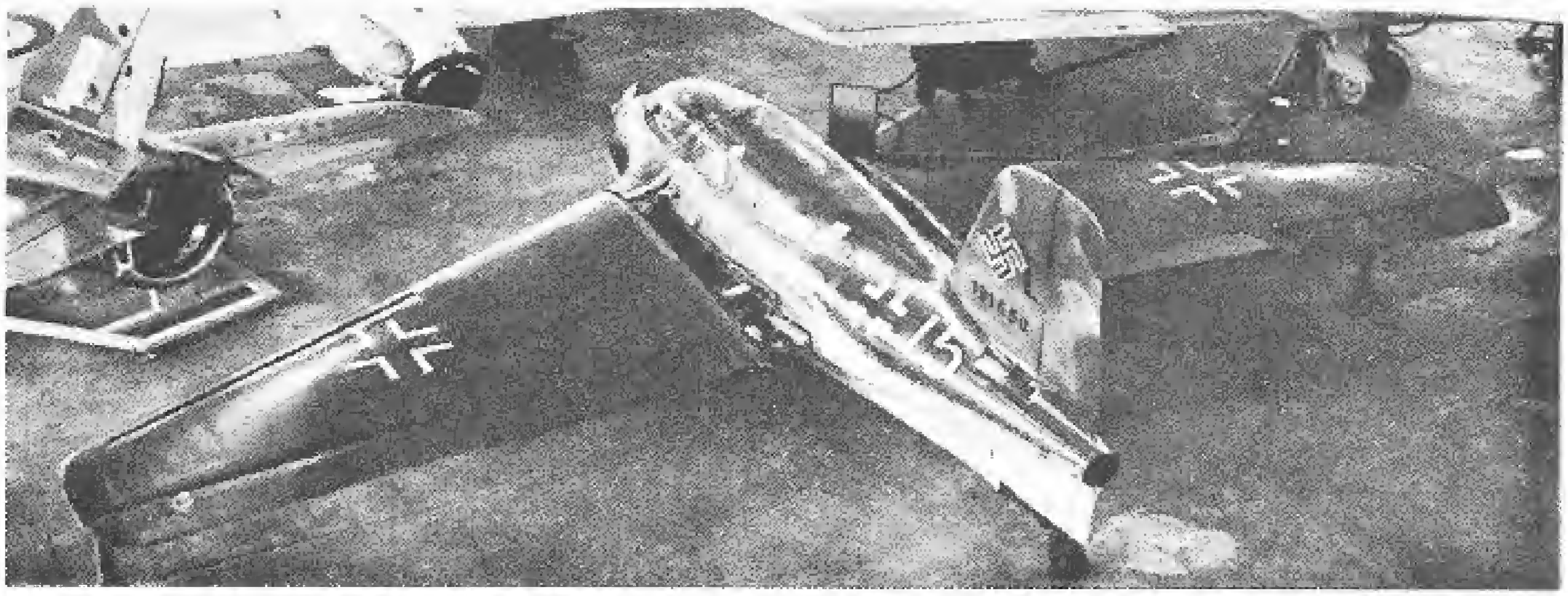
Me-163B "Komet" Werk Nr. 191301 is examined by U. S. Air Force officer at Freeman Field, Indiana. Note main fuel tank location and lower skid structure.

This captured M3-163B was displayed at several U.S. Air Force bases following the war. It was dismantled for close examination.

Putting the final touches on Me-163B Werk Nr. 191316 at the Messerschmitt Regensburg factory.

Me-163B "Komet" on exhibit at R.A.F. Station "Biggin Hill" before restoration and presentation to the Deutsche Museum.

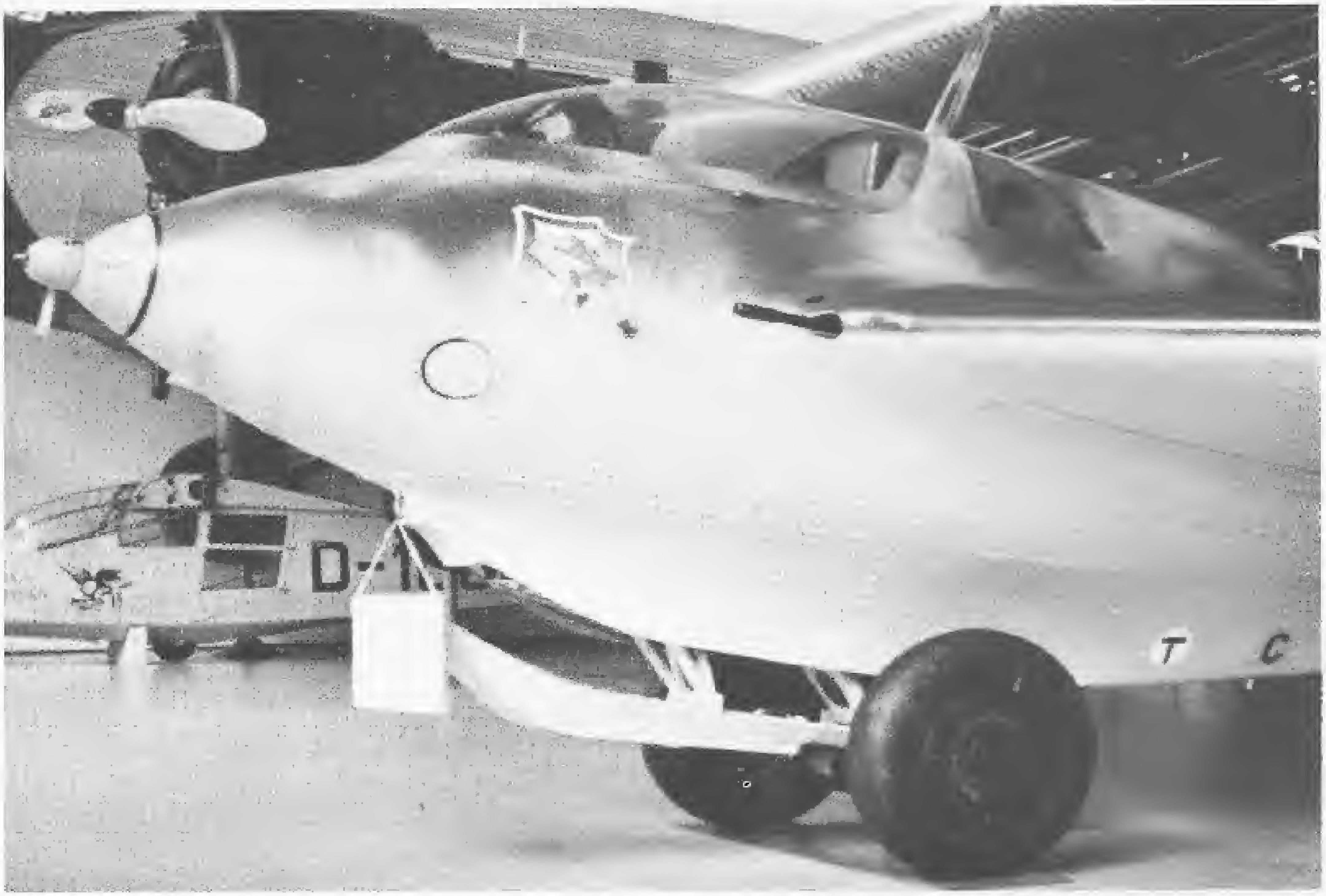
Me-163B Werk Nr. 191659 inside hangar at the College of Aeronautics, England. Note it's small size compared to other aircraft.



This view of Me-163B clearly shows it's small size and tail-less design.

Messerschmitt Me 163 in the "Deutsche Museum" Munich

The "Komet" as it now appears on display at the Deutsche Museum, Munich, Germany.

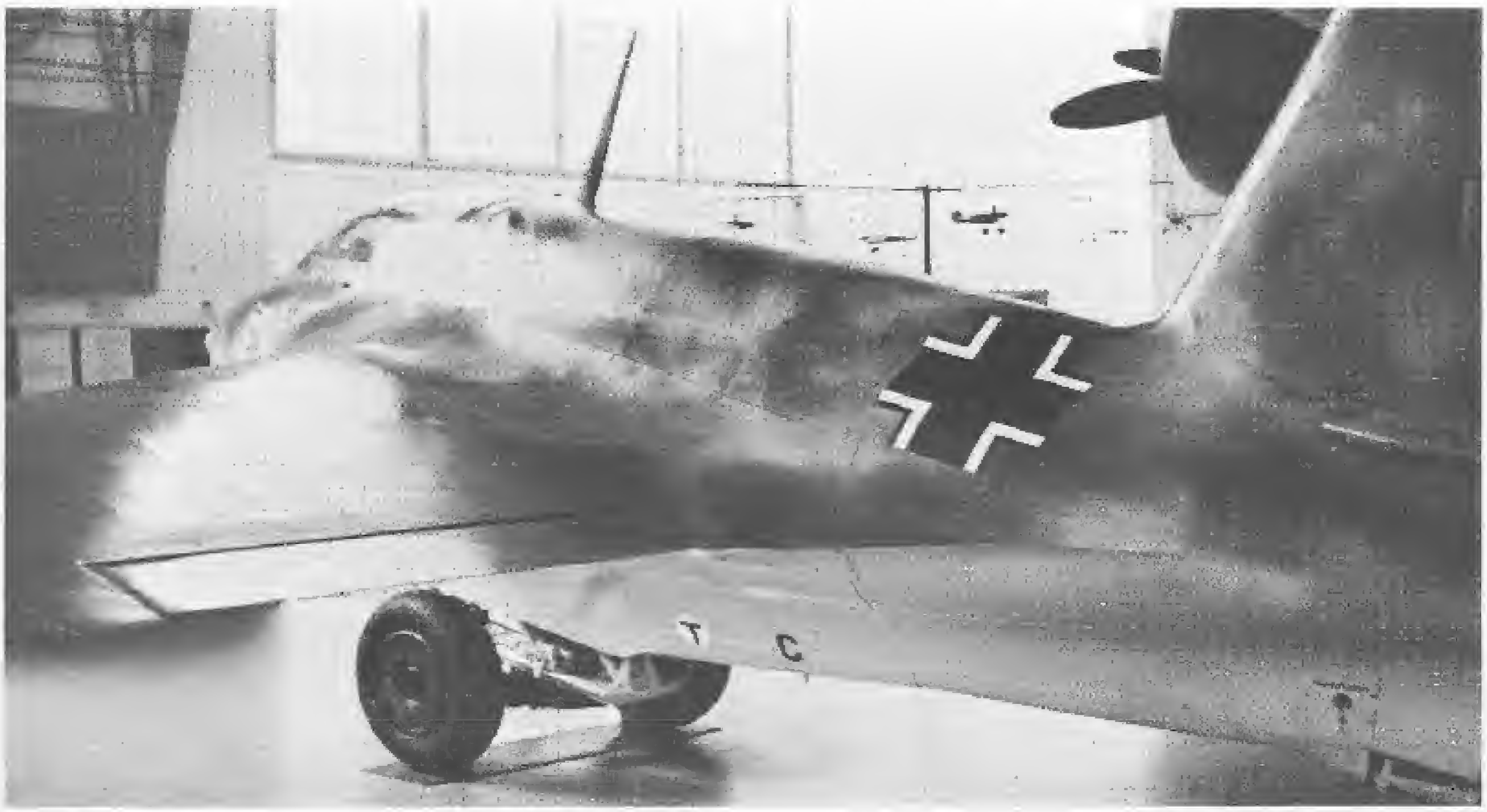


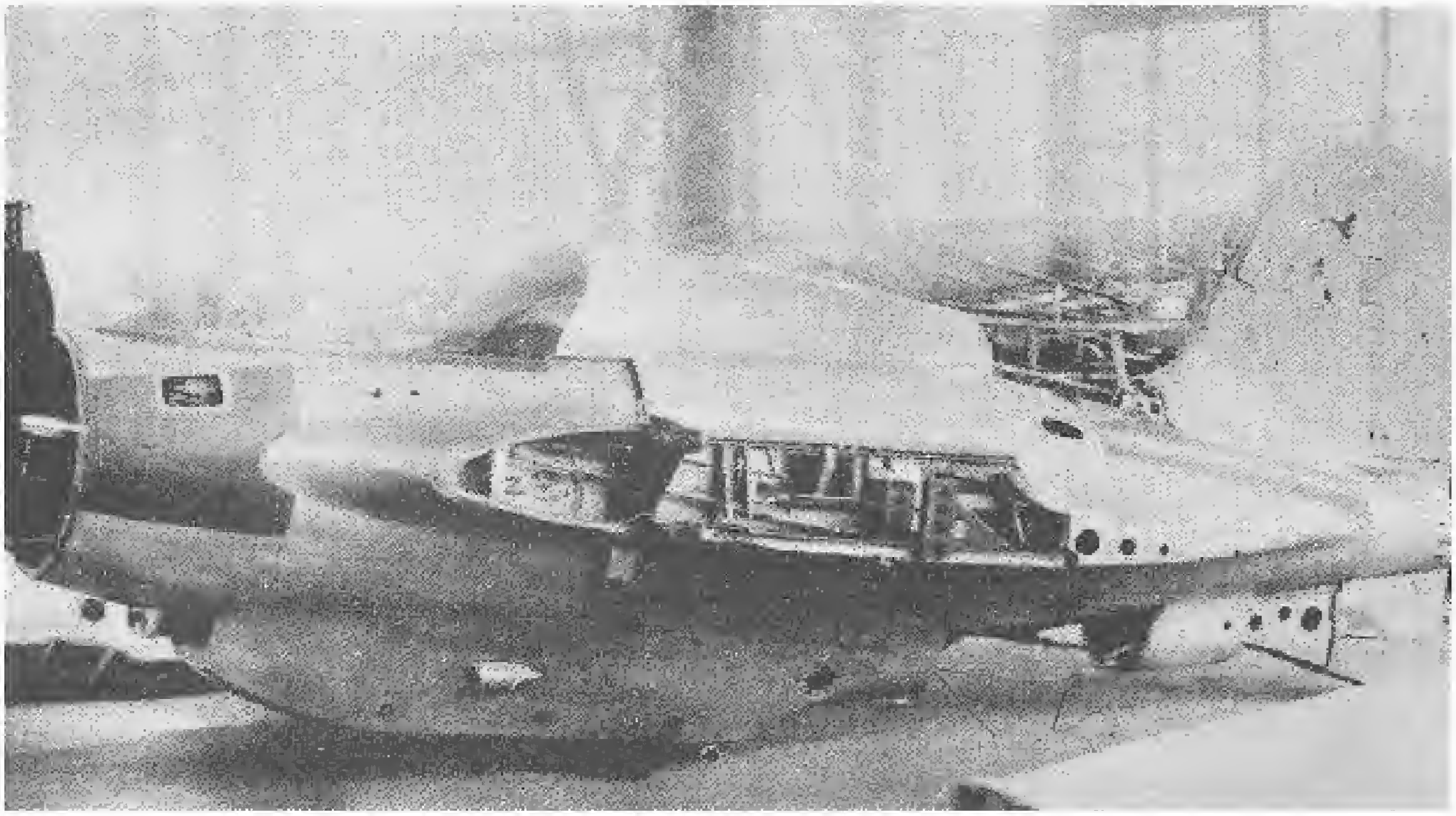
Note the interesting undercarriage details in this view. Cannon appears to be MG-151/20 20mm cannon.

Dr. Alexander Lippisch's tail-less Me-163B was one of Germany's great war triumphs. It caused great concern to Allied Bomber Command.

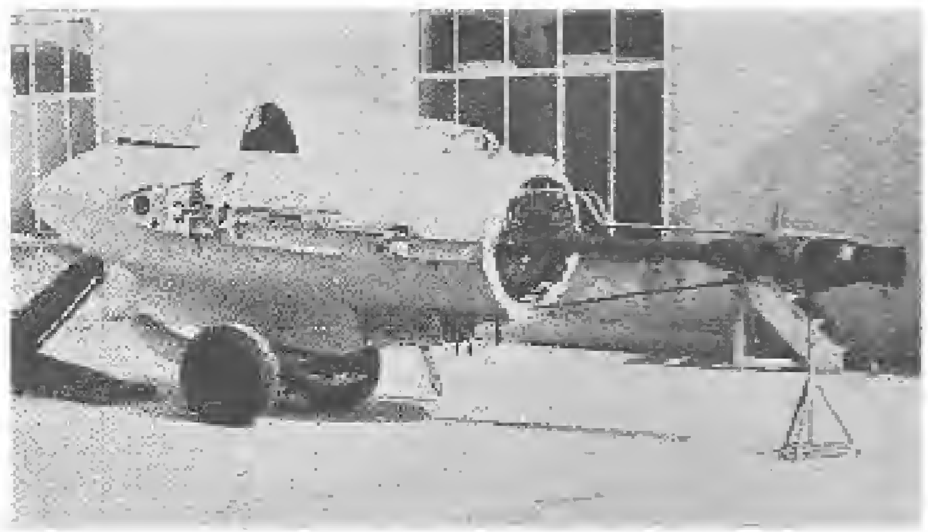
Rear view of the Deutsche Museum's Me-163B shows where body skin panels have been removed to permit close interior inspection.

Smooth contour wing fillets connected the wing-fuselage juncture permitting a clean flow of air over surface.



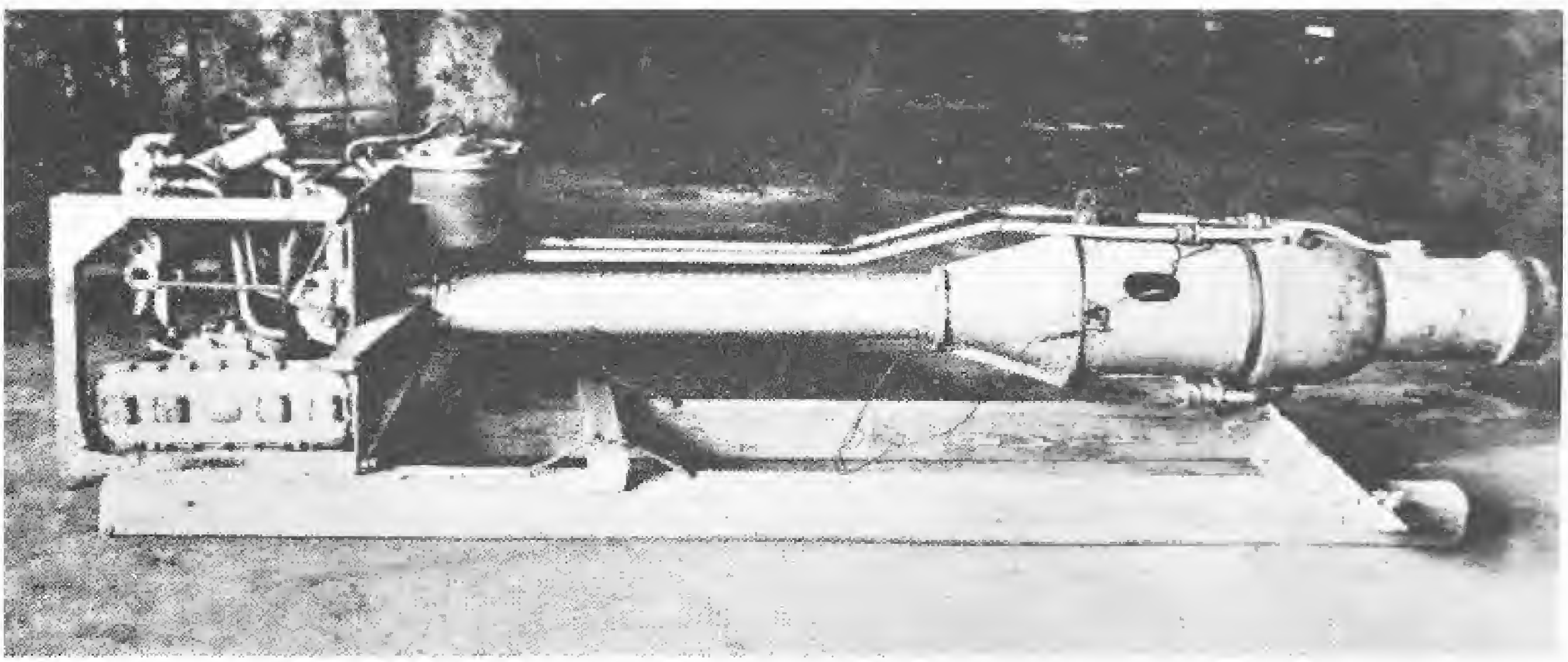


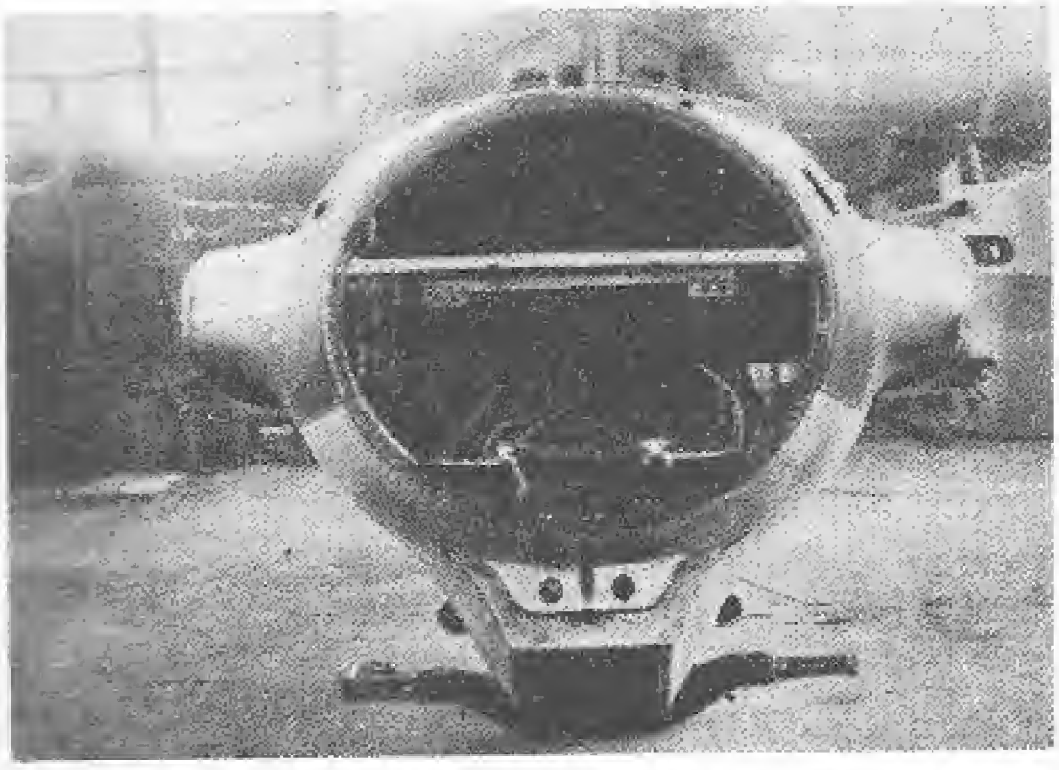
The second "Shusui" prototype sits on the production line at the Mitsubishi factory.



This wingless "Komet" gets its Walter 109-509 bi-fuel rocket engine installed.

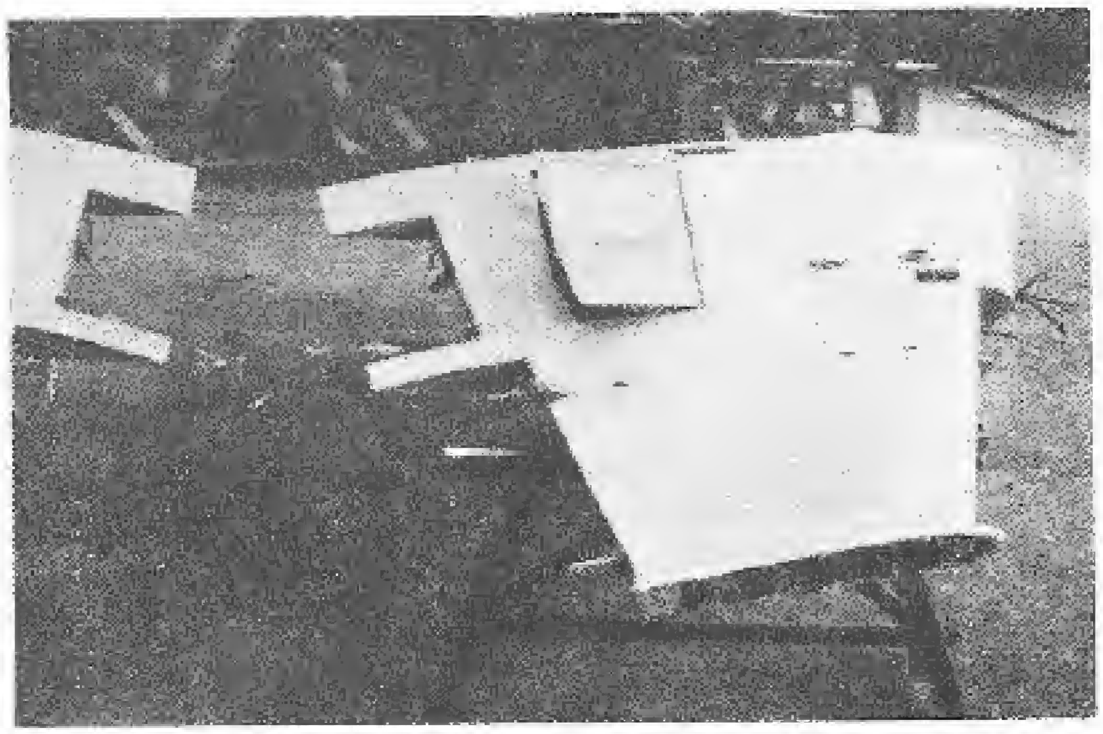
The Japanese built their bi-fuel rocket engine at the Yokosuka Naval Arsenal. It was designated Toka-Ru-II. It is now on display at The Air Museum, Ontario, California.





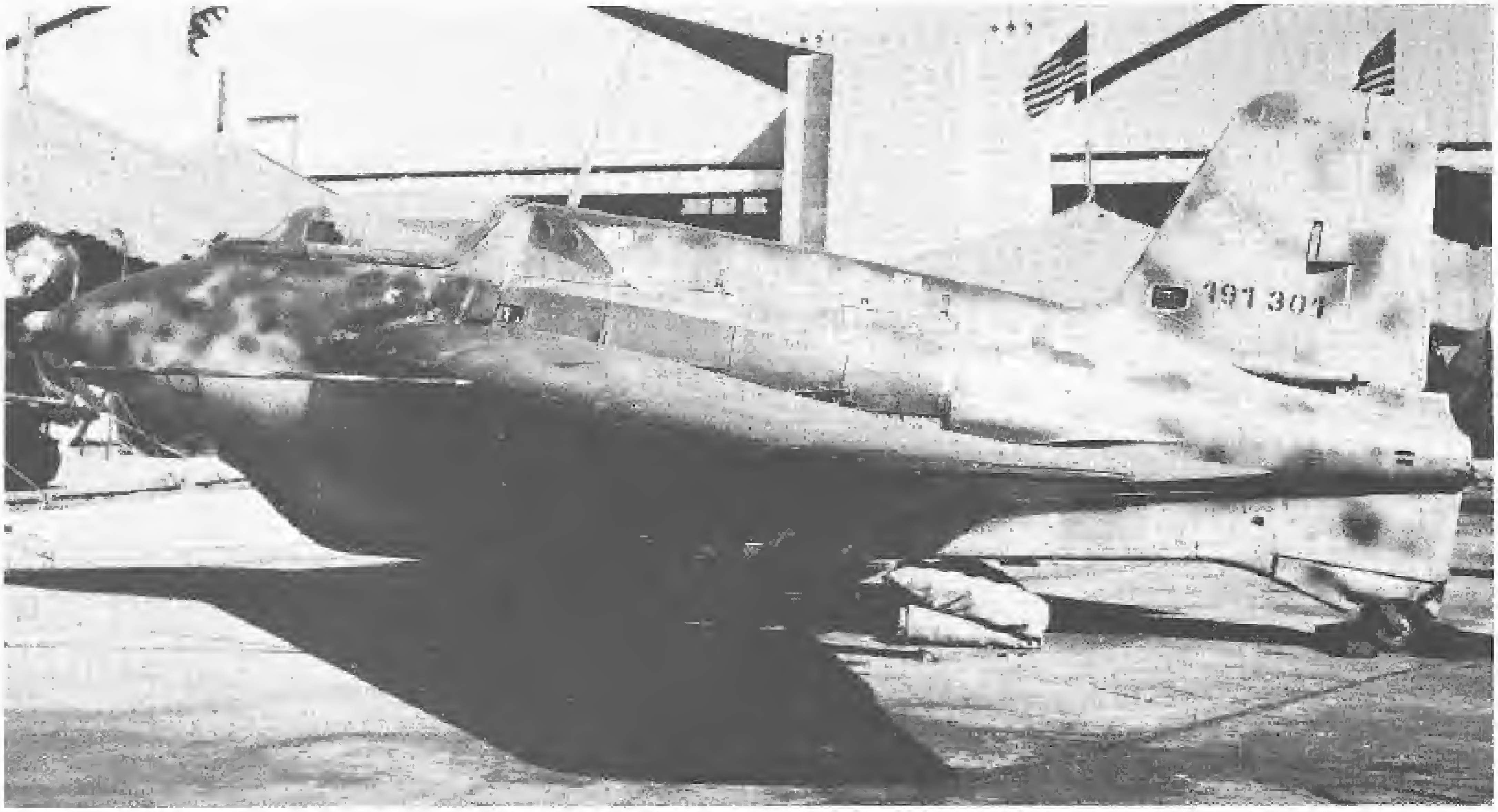
Uncompleted J8M-1 fuselage awaits nose, wings, canopy and wheels at Mitsubishi factory.

Wing panels of the J8M-1 were of all wood construction. Note flap position.



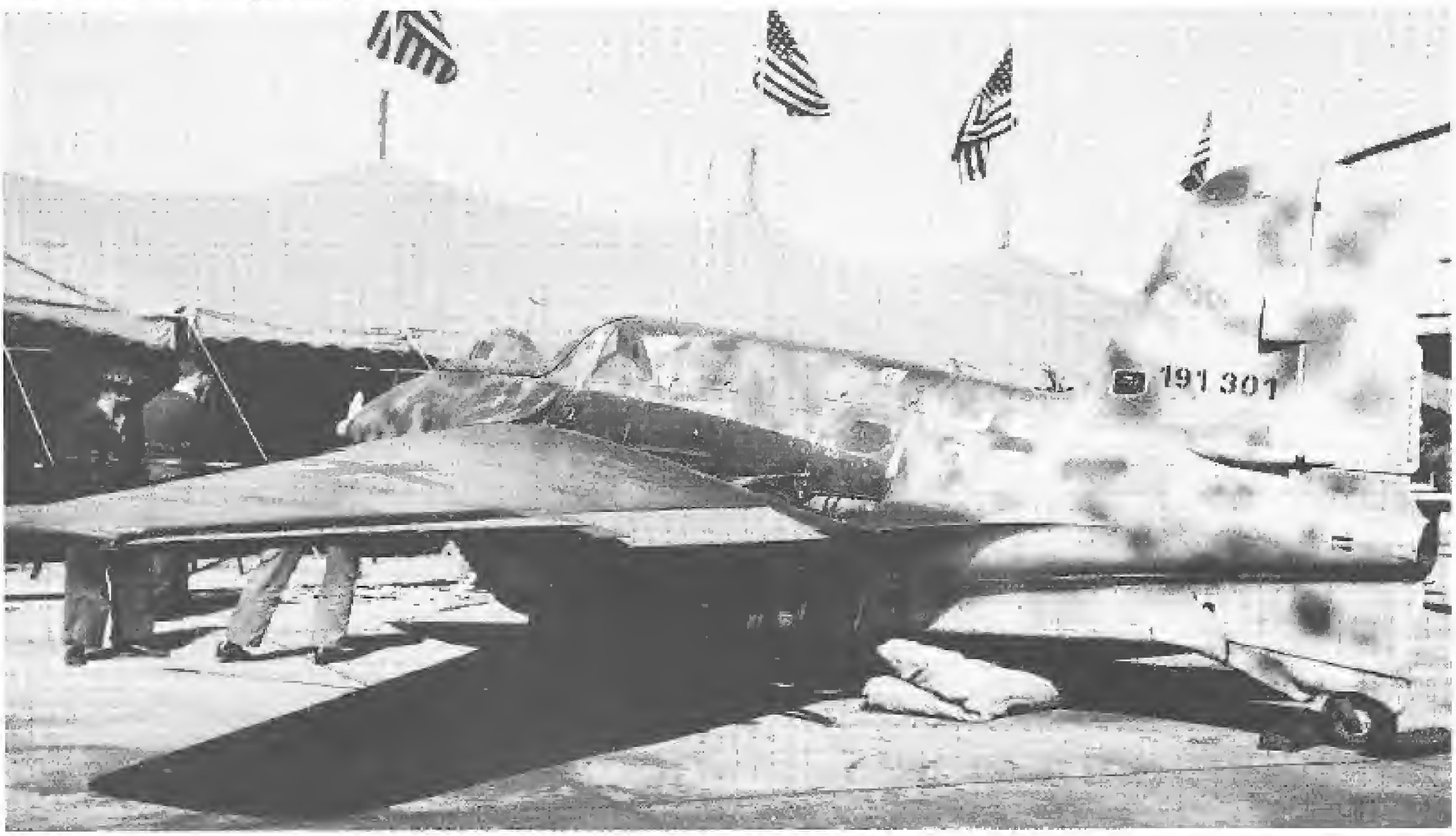
Dr. Alexander Lippisch and Herr Vogel on an inspection trip to Edwards Air Force Base upon commencement of flight trials of a captured Me-163B.

A captured Messerschmitt Me-163B "Komet" sits at a Royal Canadian Air Force Base awaiting restoration. This aircraft had been placed on public exhibition following the war and hundreds of visitors names adorn its nose and fuselage sides. Wing flap is extended in the "down" position. Note the pilot's 30mm thick bullet proof glass.

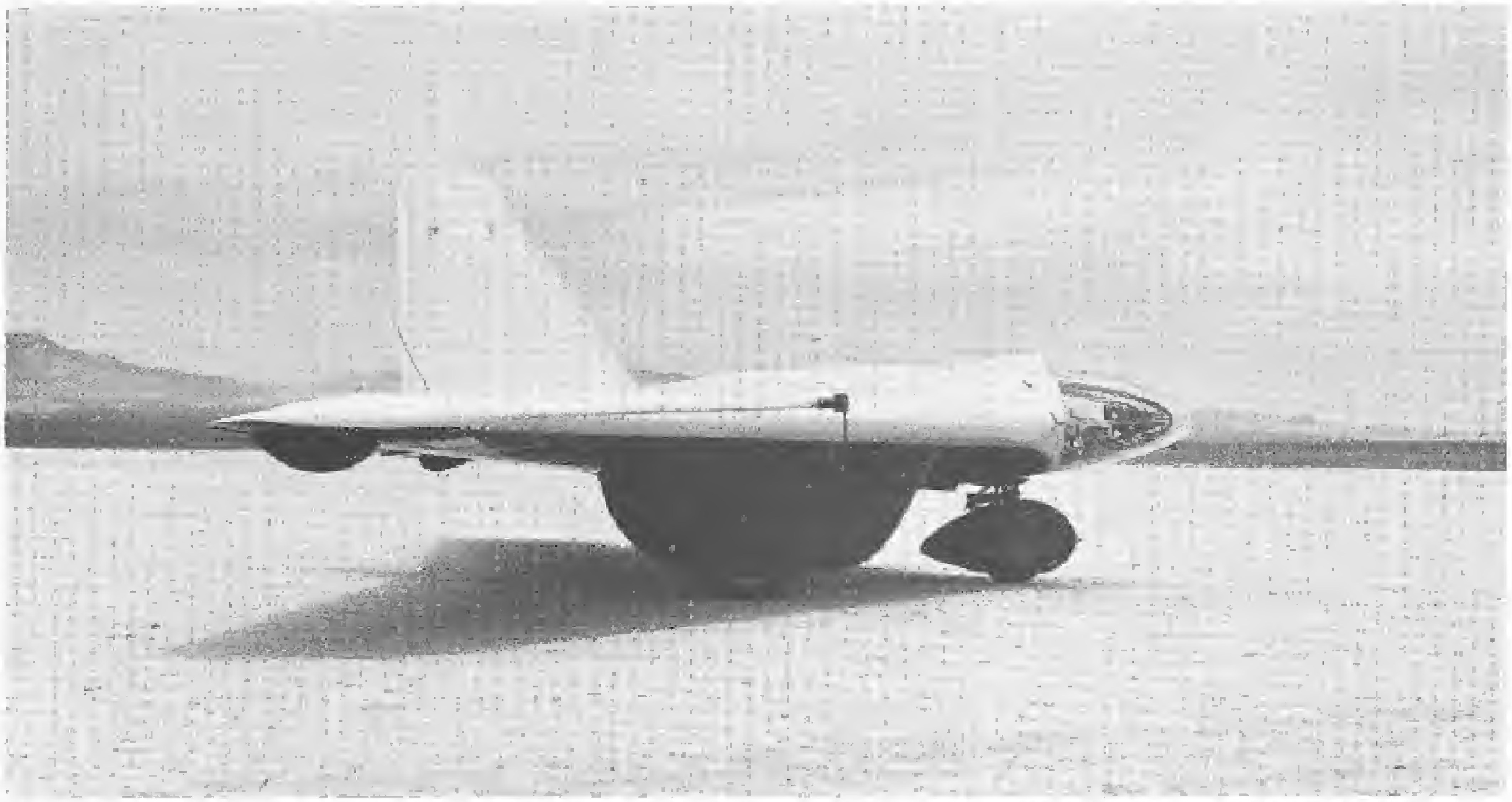


First public showing of a captured Me-163B "Komet" was held at the Wright Field "Air Fair" following the war.

This Me-163B Werk Nr. 191301 was complete except for wing fillets. It was later destroyed along with dozens of other captured prizes of war.

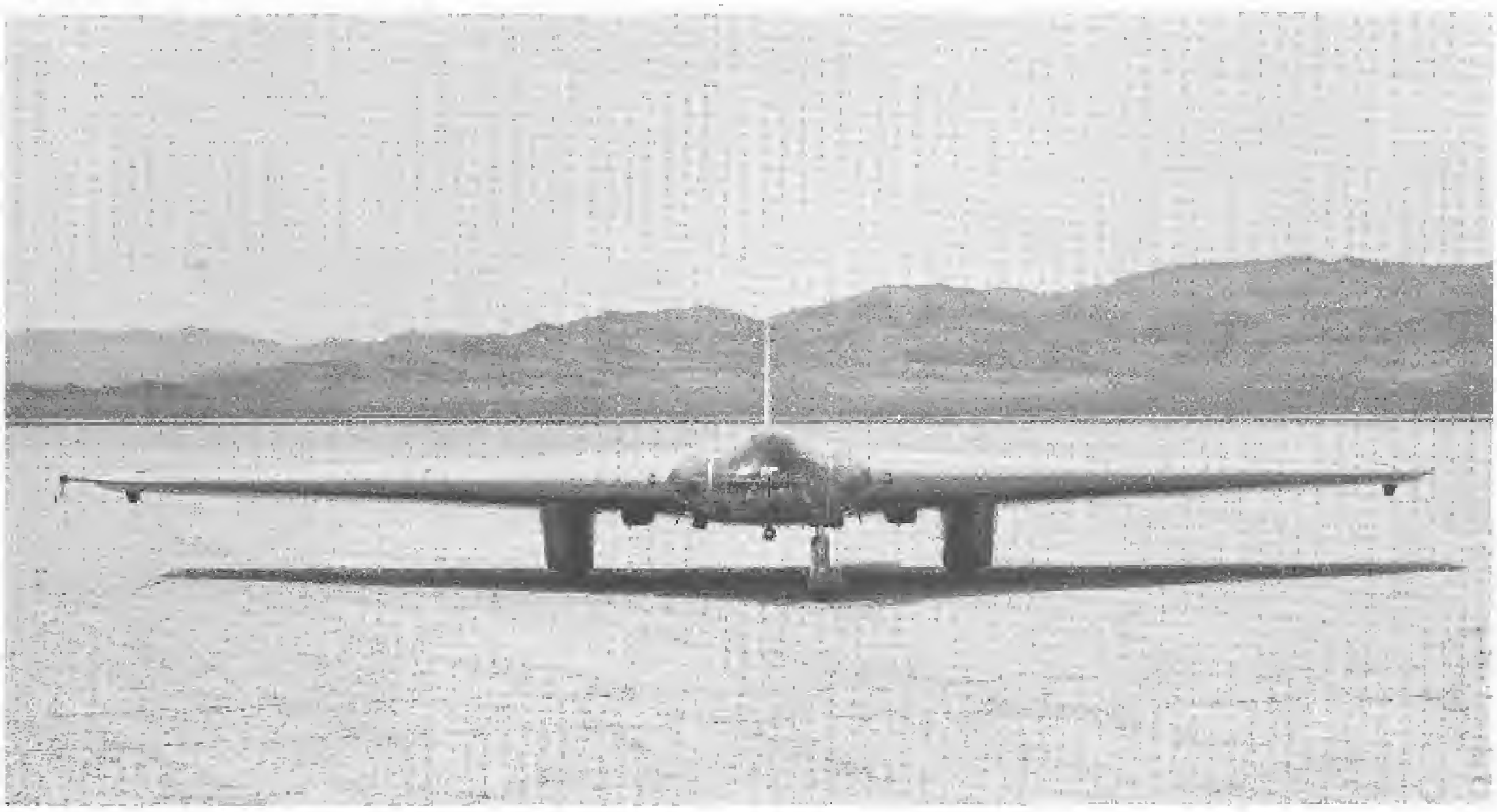


Rare view of the Me-163B at Edwards A.F.B. being towed aloft by a Boeing B-29 Bomber. Dangerous nature of rocket fuels and inability to get spare parts prevented actual flight tests of the "Komet" under power. B-29 would tow "Komet" to altitude, cut it loose. Much valuable data was gathered on this tailless fighter.



America's only tail-less rocket fighter of World War II was this experimental Northrop MX-324 "Rocket Wing" aircraft. Great secrecy surrounded the project before it was completed during early 1944. The prone cockpit enabled the pilot to be flat to withstand higher "G" accelerations.

Clear head-on view of the Northrop MX-324. This tail-less aircraft featured a fixed landing gear and wire braced rudder. It was first flown near Barstow, California, in July 1944. It was towed aloft to 8,000 feet by a P-38 fighter and cut loose after its 200 lb. thrust Aerojet XCAL-200 rocket motor was ignited. It made a number of successful test flights.



Aero series